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[OFFICIAL NOTICE.]

Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R. Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

Obituary Minutes to the Memory of the Late Captain William Henry White, Adopted by the Society of Gas Lighting.

The shadow of death has again passed over the Society of Gas Lighting, another name has been blotted out from our roll of membership and another comrade has been taken from among us—one of the brightest, most esteemed and earnest workers in our profession. We shall long miss Captain William Henry White, who died at his home, the Hotel Marie Antoinette, New York city, July 3d, 1904, of pneumonia, followed by a paralytic attack.

His illness was comparatively of short duration, and almost from the first his physicians gave very slight hopes of its favorable termination, notwithstanding which the announcement of his death came as a distinct shock to all who comprised the wide circle of his friends and acquaintances, and doubly so to the members of the Society of Gas Lighting, where he was so well known and universally beloved.

It is no easy task to find words to adequately express the sense of loss to our profession, or the feeling of personal loss to each and everyone of us. We who were privileged to be intimately connected with him, meeting him frequently socially as well as in business relations, knew him as he was, and not only as the genial, cheerful and always pleasing companion, but as a man, ever ready and willing to aid his fellows with sound advice, and to freely impart to all the knowledge and experience that he had gained during his long and varied career as an engineer. Many of our young engineers will long hold his memory in grateful remembrance for helpful counsel given them in time of need.

He was generous to a fault, both heart and purse always responding to appeals from those who were unfortunate, requiring substantial assistance.

Erect in stature, of pleasing appearance, endowed with a strong individuality, he was always sought for to assist at our public as well as private meetings or entertainments. We have all many times listened to the easy flow of rhetoric with which he was wont to address us; never wearisome, always enjoyable and always appropriate whatever might be the occasion. It may be safely said that it will be long before his place in the profession can be filled; his place in the hearts and affections of his intimate friends never can be.

Captain White was born in the city of Philadelphia, March 4th, 1843, and when quite young acted as Private Secretary to Hon. Fernando Wood. In 1862, soon after the outbreak of the civil war, when about 20 years of age, he enlisted as a private in Company G, 68th Pennsylvania Volunteers; in August, 1863, he was promoted Sergeat Major and immediately after received his commission as First Lieutenant and was mustered out at Hart's Island, N. Y., June, 1865. His service was entirely in the Army of the Potomac, 5th and 6th Corps, taking part in the battles of Antietam, Fredericksburg, Chancellorsville and Gettysburg, and the engagements in the Wilderness. His father, Col. Ambrose White, was at that time Engineer of the Metropolitan Gas Company, New York city, and after being mustered out he entered the service of that Company with his father. In the year 1866 he assumed charge as Engineer of the works of the Memphis (Tenn.) Gas Company, remaining there for some time. He next took charge of the gas works in Elizabeth, N. J. In 1870 he was appointed Engineer of the Peoples Gas

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Company, Brooklyn, N. Y., remaining there until 1872, when he took charge of the works of the Citizens Gas Light Company, also in Brooklyn. In 1878 he was the New York Manager of the Goodwin Gas Stove and Meter Company, of Philadelphia, and in 1881 was Constructing Engineer of the Equitable Gas Company, of Baltimore, Md., remaining there till the year 1883, since which time he had been engaged in the business of contracting and consulting engineer in gas, water and electricity, erecting numerous plants throughout the country.

At the time of his death he was the Secretary of the Society of Gas Lighting. He was Past-President of the American Gas Light Association, an honorary member of the New England Association of Gas Engineers, and also of the Western Gas Association. For several years he was President of the Little Falls (N. Y.) Gas Company, and was also President and Treasurer of the Selma (Ala.) Water Company.

In Masonry he had attained the exalted position of 33d degree, held office in the Grand Lodge, was Commander of Clinton Commandery (1878) No. 14 Knights Templars, and Past Master of Aurora Grata Lodge. In military organizations he was Captain of the Old Guard, member of the Loyal Legion, which is composed of commissioned officers surviving the Rebellion, member of the Army and Navy Club and comrade in Washington Post of the Grand Army of the Republic. He also belonged to the Yale Club, New York Yacht Club, New York Athletic Club, Lawyers' Club, Metropolitan Museum of Art, New York Botanical Society, Engineers' Club, of New York, and in business firms he was Vice-President of the R. E. Dietz Company and Director in the Steam Gauge and Lantern Company of Syracuse. His devotion, however, was most manifest to the Lotus Club, of New York, of which he was Vice-President for many years.

The funeral services were held at the residence of his sister, Mrs. W. A. Denniston, in Brooklyn, July 6th, and he was followed to the grave in Greenwood Cemetery by a large and representative body of his friends and acquaintances.

W. H. Bradley, Chairman,
Walter A. Allen,
Thomas E. Byrne, } Committee.

[Official Notice.]

Thirty-Second Annual Meeting, American Gas Light Association.

American Gas Light Association,
Office of the Secretary,
New York City, Sept. 14, 1904.

General Announcement.—There will be an annual meeting of the American Gas Light Association held at Washington, D. C., October 19th to 21st, 1904. The meeting will be called to order by the President, Rollin Norris, of Philadelphia, Pa., at 10 A.M., on Wednesday, October 19th.

The meeting hall will be on the tenth floor of the New Willard Hotel. The headquarters will be at the New Willard Hotel, 14th and F streets, Washington, D. C.

The most satisfactory quarters are always obtained by writing in advance to the hotel people, and in doing so a reply should be requested, for which a self-addressed stamped envelope should be inclosed, as misunderstandings may thereby be averted.

The New Willard Hotel is conducted solely on the European plan, and the rates for rooms will be as follows: Rooms without bath, $2.50 per day and upwards; rooms with bath, $3.50 per day and upwards. Double rooms without bath, $4 per day and upwards; double rooms with bath, $5 per day and upwards.

As the meeting room is in the hotel, it is hoped that all will make their headquarters at this hotel. There are, however, other hotels in the vicinity.

The roll call will be made by means of the door card system. Each member upon entering the hall for the first time will, at the door, receive a special card upon which he will find his name, address, etc., as it appears on the Secretary's books, and such card should be corrected and given to the doorkeeper. Members in attendance should attend to this very carefully, as these cards are used immediately after the meeting for correcting the annual membership list. Visitors will please hand to the doorkeeper their personal cards. A blank form of application for membership accompanies this circular. More can be obtained of the Secretary.

Remember, all applications must be in the hands of the Secretary by October 10th at the very latest, otherwise they will not be acted upon at this meeting.

The list of papers to be read at the meeting is as follows:

"Generation of Steam by Waste Heat from Water Gas Sets," by Donald McDonald, Louisville, Ky.

"Distributing Power Throughout a Gas Works by Means of Electricity Generated at a Central Point," by W. A. Baehr, St. Louis, Mo.

"Oxide Purification," by E. H. Earnshaw, Philadelphia, Pa.

"Methods of Charging for Gas," by F. W. Frueauff, Denver, Col.

"Consumers' Meters," by B. H. Spangenberg, Philadelphia, Pa.

There will also be discussions on subjects connected with coal gas manufacture.

All members attending the meeting are particularly requested to wear their membership badges in plain sight, thereby greatly aiding the officers and the local committee in their work, by affording a ready means of recognition.

In order that the year book containing the report of this meeting may be published and issued to the members immediately after the meeting, notice is hereby given that if any of the speakers at this meeting desire to correct their remarks before they are printed, they will be given an opportunity before leaving Washington, but not after. The stenographer will have typewritten copy of the principal discussions prepared at the headquarters between the sessions of the meeting, and all those who desire to correct their remarks must notify the Secretary at the close of the session at which such remarks are made, as all the reports will be turned in to the printer immediately after the adjournment of the meeting.

Special.—As Washington is a very interesting city, it has been decided to have no entertainment on Wednesday night—leaving the members free at that time. There will, however, be a banquet on Thursday evening, and a steamboat excursion to Mount Vernon on Friday with luncheon.

For the ladies there will be on Thursday a trip around Washington in automobiles, and the Mount Vernon trip on Friday.

There will probably be a theater party for the ladies on Thursday evening, as the banquet will be for the men exclusively.

The price of tickets, including all the entertainments, will be $5.

A. E. Forstall, Secretary.

BRIEFLY TOLD.

Some Random Notes from the World's Fair.—No. II.—World's Fair, St. Louis, Mo., Sept. 12th. Dear Journal: "Charlie" Faben, and his son Charles, have been here for the past week. Charles H. Dickey and family were also in town last week. Taken as a whole the week was an enjoyable one; in fact, we could have had quite a good sized gas convention at any time. The regular jurors will likely be here another week to finish their labors. Mr. Paul Doty was elected Vice-Chairman of Jury No. 2, group 49, of Manufacturers' Building. The juries are composed of 20 to 30 men, and they in turn are divided into working juries of 4 or 5 men, so that each department is sure to get at least one technical man in the jury. The attendance for the week ending the 10th inst., was about 900,000, a decided gain over any previous 6 days. September 15th will be St. Louis day, when 500,000 people are expected to pay admission. Any person who misses this fair from pure indifference is making a horrible mistake. There never has been, and probably never will be anything of the nature to compare with it. The exhibits and every condition of climate are perfect for an enjoyable trip here at this time. Miss Mary Evans Dillard, Teacher in Home Economies, of Lynchburg, Va., was a visitor at the Western Gas Association exhibit this week. Miss Dillard was much pleased with the many improvements shown in gas ranges. The following registered at the Association's display during the week: H. F. Koenig, Sr. and Jr., Cincinnati; J. McScott and wife, Marshall, Mo.; H. F. Blackburn and wife, same city; Mr. M. Blinks, Kalamazoo, Mich.; J. Steinin, Pekin, Ills.; F. H. Wells, Albany, N. Y.; John R. Coen, Ottumwa, Ia.; C. O. Somdahl, Ft. Wayne, Ind.; J. B. Webb, Hoboken, N. J.; Mr. and Mrs. H. Maurer, Rochester, N. Y.; F. G. Corbus, Cleveland, O.; C. N. Stannard, Denver, Col.; C. F. Burgess, Madison, Wis.; A. J. Snyder, Louisville, Ky.; H. B. Wilhoyte, Louisville, Ky.; T. J. Talon, Toledo, O.; D. B. Dyer, Augusta, Ga.; R. B. Everson, Chicago, Ills.; T. M. Ambler, St. Louis, Mo.; Mr. and Mrs. G. H. Warner, New York City. Mr. J. D. Orida, of Queensland, Australia, was among the foreign visitors, as also were A. F. Leggatt, Ottawa, Canada; Nicholas D. Paschuckz, M.E., St. Petersburg, Russia; and Dr. W. Vieweg, of Berlin. The latter is serving as an assistant juror on awards, and is a very welcome visitor.—F. R. Persons.

Personal.—Mr. Thomas H. Hintze, Superintendent of the Lowell (Mass.) Gas Light Company since 1889, has resigned that position, the resignation to date from the 1st prox. He is to be succeeded by Ar. A. C. Pease, of Yonkers, N. Y.

[Continued from Page 411.]

TWELFTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD IN MECHANICS' INSTITUTE, SAN FRANCISCO, CAL., JULY 19 AND 20, 1904.

SECOND DAY—MORNING SESSION.

The Secretary then read the

REPORT OF THE COMMITTEE ON PRESIDENT'S ADDRESS,

which, on motion of Mr. Martin, was received and its recommendations adopted.

Mr. P. W. Prutzman, chemist to the California Petroleum Miners' Association, read some

NOTES REGARDING CALIFORNIA PETROLEUM.

As the paper and the discussion thereon are rather of greater interest to the gas making residents of the Pacific Coast than to those east of the Rockies, we will omit the printing thereof, especially since the matter may be obtained by applying to Dr. Dean, of the California Petroleum Miners' Association.

On motion of Mr. Jones a vote of thanks was tendered to Mr. Prutzman for his paper. A motion to adjourn until 2 P.M. was adopted.

SECOND DAY—AFTERNOON SESSION.

The meeting was reconvened pursuant to adjournment.

The President appointed Messrs. E. C. Jones, T. R. Parker and John A. Britton to act as a Committee on Obituaries.

The President called upon the Secretary to read the contents of the

QUESTION BOX.

The Secretary—I want to state as a preliminary that these are actual, *bona fide* questions sent to me by members of the Association. I think a large proportion of them will bear a great deal of discussion. I referred these questions to members of the Association, and the answers I will read are the answers of those members to whom the questions were referred.

No. 1. "What gravity of oil is most efficient in crude oil water gas manufacture?"

Answer.—With California oil, about 14° B. The heavier the oil the better the result, but heavier than 14° is difficult to handle.

No. 2. "For what reason is the condensers left out in the crude oil water gas process? Is naphthaline formation any the worse by using scrubber alone?"

Answer.—Owing to the requirements of the gas making process the ordinary condenser is unnecessary. Naphthaline formation is no worse by reason of discontinuing use of condenser. The writer considers it less so.

No. 3. "Has any member used in the manufacture of crude oil water gas oils of different gravity. If so, have they kept strict account of the relative value of each for gas making; *i. e.*, the number of cubic feet of gas made per barrel from the different grades or gravity of oil. What are the results shown?"

Answer.—Yes, all grades have been used and the lower grades have given somewhat better results than the higher. Strict records have been kept, but are not at hand.

No. 4. "When making gas into an unweighed holder—exhausting from same (with varying steam) into a weighted holder—and supplying gas to the town, all at the same time, how can the amount of make be accurately figured, there being a difference in the atmospheric temperature of from 20° to 40° during 24 hours?"

Answer.—The above question represents emergency conditions, which should be remedied by the introduction of a station meter between the purifiers and the storage holder.

No. 5. "What is the significance of the official badge of the Pacific Coast Gas Association?"

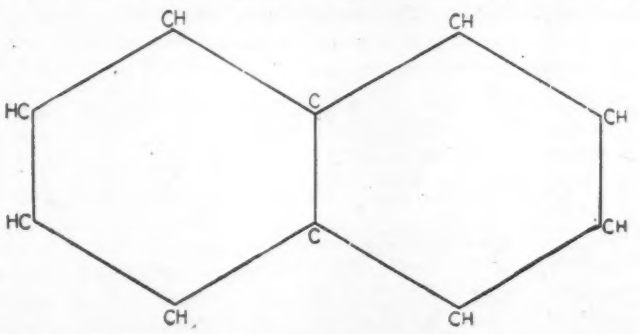
Answer.—The origin of the seal of the Association was a small rosewood frame, carved by Mr. Edward C. Jones, Superintendent of the South Boston, Mass., Gas Light Company, in the early days of the business, and is intended to represent a continuous line of pipe, representing a perfect circulation of gas—no dead ends, the ultimate aim and object of every gas man—and the burner in the center of the seal is emblematic of the point that every gas engineer works to—the ignition of the gas.

No. 6. "How can the same results, in the same length of time, be obtained from gas used for light, heat or power at 5,000 feet above sea, as are obtained at sea level? A gas meter is set to register correctly at sea level, will the same meter register correctly 5,000 feet above sea level? If not, why not?"

Answer.—At an elevation of 5,000 feet above the sea, the barometric pressure is abont 24.8 inches, or 5.2 inches less than at sea level. This reduces the atmospheric pressure about 2½ pounds per square inch, and as the pressure is reduced gas becomes more attenuated, so that 1,000 feet of gas at sea level would occupy a space of about 1,172 cubic feet at an elevation of 5,000 feet. If the 1,000 feet of gas at sea level contained 600,000 British thermal units, then the 1,172 feet at 5,000 feet elevation would contain the same number of heat units, so that it would require theoretically 17.2 per cent. more gas to perform the same amount of work. This seems to be proven in practice, because the average gas used per consumer in Grass Valley, which is a mountain town at an elevation of about 2,500 feet, is 1,383 feet per month, while the average amount of gas used per consumer in Petaluma, which is a town practically at sea level, and of about the same size, is 1,255 feet per month. These are both high pressure towns. A gas meter is set to register *volume* of gas correctly, and will register correctly in cubic feet of gas passing through it regardless of changes of temperature or barometic conditions, which may affect the relative density of the gas.

No. 7. "What is naphthaline?"

Answer.—Naphthaline C_{10} H_8 is an aromatic hydrocarbon which was discovered December 15, 1819, by A. Garden, and formed in the distillation of coal tar. Afterward J. Kidd obtained the same substance by passing the vapors of coal tar through a red-hot tube, and gave it the name of "Naphthaline." (Phil. Trans. 1821, 209.) Its correct composition was first determined by Faraday. Phil. Trans. 1826, II., 140.) It was first assumed that naphthaline existed as such in coal, but this idea was shown to be not accurate, but that naphthaline was a product



formed by distillation. Erlenmeyer proposed the following formula, which consists of two aromatic nuclei which have 2 carbon atoms in common: Naphthaline is sometimes formed by the condensation of hydrocarbons of the acetylene series. Berthelot found that by heating acetylene to a temperature at which glass softens, that a considerable quantity of benzine and naphthaline is produced. Naphthaline crystalizes in plates, has a characteristic unpleasant odor (well known to gas men), melts at 79.2° C. and boils at 218° C. Its specific gravity compared with water at 4° C. is 1.145; at 80°, 0.9777.

No. 8. One thousand feet of 22-candle gas will heat a certain quantity of water to the boiling point in 5 minutes; how many feet of 20-candle gas would be required, the same conditions to govern?"

Answer—The quality of hydrocarbons which go to make up candle power is so uncertain and unstable that it is only possible to give an approximate answer to this question. If the two candles increase were due to ethylene, there would be a difference of about 33,640 B.T.U. to the 1,000 feet of gas, or approximately 5.6 per cent., so that it would theoretically require 1,056 feet of 20-candle gas to do the work.

No. 9. "How many gallons of water per hour should pass through a crude oil water gas machine making 5,000 feet of gas per hour?"

Answer—The quantity of water necessary for cooling and cleansing the gas depends in a great measure on the type and efficiency of the apparatus used for condensing and scrubbing. In one of the larger crude oil water gas plants, it has been found that 64 gallons of water were sufficient to condense and scrub the gas. This amount of water reduced the temperature of the gas to 60° F., and removed all solid suspended matter. In practice it has been found that 80 gallons of water per 1,000 cubic feet will cool and cleanse the gas satisfactorily. The amount of water necessary to produce 1,000 cubic feet of crude oil water

gas, including all water fed to the boiler for the making of steam, for gas making, and the operation of auxiliaries including boiler feed pump, oil pumps, pumps for handling, condensing and scrubbing water, exhauster and hoisting engines for cleaning out lampblack separator, but not including any water for condensing and scrubbing, amounts to 18.1 gallons, or 150.77 pounds per 1,000. Weight of water used in this calculation, American gallon of 231 cubic inches weighing 8.3356 pounds.

No. 10. "When the total cost of gas decreases as the output increases, which are items of cost that decrease, and in what proportion?"

Answer—If manufacturing conditions (which include ample storage capacity) are good, all the fixed charges (including labor for slight increase) should diminish directly proportional to the increased output.

No. 11. "What is the lowest candle power, and also the lowest calorific power of gas which it is advisable at present to supply present consumers with?"

Answer—The introduction of the incandescent gas burner has completely upset the old relationship of candle power and light, so that the most economical gas for the consumer to-day would be a gas of low candle power and high calorific value, but as gas is still used in open flame burners, it has not been thought advisable to reduce the candle power below 16-candle power, although a gas of lower candle power and containing 600 or more B.T.U. per cubic foot will give better results per thermal unit in the Bunsen burners of heating appliances and incandescent burners for lighting, as it has been found that the higher illuminants which go to make up candle power will not develop their full theoretical thermal value when burning through a Bunsen burner. In answering the latter part of this question, as to the lowest calorific power of gas which it is advisable to supply, it has been found highly inadvisable to distribute non-luminous water gas containing 300 B.T.U. per cubic foot, and the writer would suggest that it is to the best interest of a gas company and the consumer to supply a gas of high calorific value. A street main distributing system will convey more energy through given sizes of pipe of gas of high heating value than of a gas of low heating value.

No. 12. "When does the gas company's responsibility cease after laying street mains and streets are put back apparently in as good condition as before opened? If then, is it good policy to refuse to make repairs a year or two later when requested by the street commissioner?"

Answer.—The responsibility of the gas company does not cease at any time so far as the care of public streets is concerned. Good common sense should dictate to the manager the necessity for putting back the roadways in first-class condition, even better than they were when disturbed, and at the request of the street superintendent or commissioner keep the same in good repair whenever requested so to do. Be friendly with the "powers that be," and that will pay better dividends to a gas company than any other investment it can make.

No. 13. "To what if any are due the objections to wrought iron purifiers instead of cast iron ones?"

Answer.—Cast iron was employed before steel construction had reached its present state of excellence. There can be no objection to the use of wrought iron or steel, if strains are properly calculated and provided against by reinforcement, and the metal is properly protected by paint.

No. 14. "Are all the plants in California making crude oil water gas affected by naphthaline?"

Answer.—Naphthaline troubles are incident to all methods of gas manufacture. Somewhat so in California, but much less than elsewhere.

No. 15. "What has been the experience of the members with the Barrett jack, manufactured by the Duff Manufacturing Company?"

Answer.—The Barrett jack has become a part of our street equipment. Whenever wrought iron pipe is to be introduced either length ways or cross ways, much time is saved and a better job done. A saving in the sharpening of picks and renewals of shovels; it obviates the opening of long trenches and the filling of same. As we have forced 2½-inch pipe 190 feet, coming through within 3 inches of where pointed for, time one hour and a half, two men from the time of setting the jack until pipe made its appearance at the far end. We have forced 4-inch pipe 56 feet under railroad (diagonally) where digging on trenching would not be allowed by railroad company, without evading legal questions. Our latest is running a 2-inch pipe 600 feet, digging 20 feet and forcing 40 feet alternately the whole distance, using the jack as a macadem breaker in the sections to be dug. The tool pushed along under the macadam raising it after the manner of a mole, leaving it ready for the shovel. No picks required. Introducing services under cement sidewalks and meeting with brick or other foundations to be pierced, withdraw the forcing pipe and clean it, introduce it again, slip a smaller pipe saw toothed on the end, using it as a hollow drill and the forcing pipe as a guide, and proceed to drill. Our experience is to use nothing smaller than a 2-inch pipe to force with where a straight hole is desired; a 2½-inch or 3-inch is still better in tough jumbo or adobe ground, roots, fence posts, brickbats, miscellaneous dumps and sometimes a tree we have surprised ourselves by passing through. It obstinate cases we hitch a rope on the end of a 5-foot lever, put 3 or 4 men on either side of the lever, and so far have never been stalled. We are now engaged on a Siamese, or double, forcing arrangement giving a pressure of 30 tons and needing no extension pieces, laying the pipe as it goes.

No. 16. "What is the best purifier for a city government?"

Answer.—The best purifier for a city government is the active participation of the intelligent masses, more especially the commercial men, in the primaries and attendance at the polls upon the days of election.

No. 17. "What are the light units per gallon of California oil properly burned at the rate of 5 cubic feet per hour?"

Answer.—The writer is not clear as to the intent of this question, as the California oil used to make gas is broken up into the various constituent gases, some of which develop heat, and others heat and light, and all of the oil does not enter into gas itself, as a portion is converted into lampblack, and some is lost by radiation of heat. In oil gas making, where no solid fuel is used, 3.4 candles have been obtained per gallon of oil used. The following data concerning this oil may be of interest: California petroleum, 14° B.; specific gravity, 0.9722; weight per gallon, 8.10 pounds; B.T.U. per pound, 19,916.5; ultimate analysis—Carbon, 86.9, hydrogen, 11.8, nitrogen, 1.1.

No. 18 "To what causes are attributable the largest consumption of gas per inhabitant?"

Answer.—The complete equipment of kitchens with gas.

No. 19. "Who are the largest consumers of gas, the poor, the middle class, or the rich?"

Answer.—The rich are the best patrons of the company, considering the total revenus received from both gas and electricity. The largest percentage of consumers are among the middle class.

Discussion.

Mr. Lowe—As to the question respecting the largest consumers of gas, etc., am I to understand that applies to companies supplying both gas and electricity?

The Secretary—Yes. It was answered by a member of the Association who has both to deal with.

Mr. Kaneen—My observation is, so far as a gas company alone is concerned, the most valuable consumers are found among the middle classes. Having made a study of the question, I found that the middle classes are the best consumers by 34 per cent., on the basis of the total number of consumers and a 12 months' consumption.

Mr. Lowe—Do you object to stating the name of the town?

Mr. Kaneen—No; San Rafael.

Mr. Martin—Another point is that the homes of the middle class do not cover as much ground as those of the rich, so you have more consumers per mile of main.

Mr. Lowe—I think that gas for fuel is introduced most easily into the houses of those who do their own cooking. I have had a great deal of experience in that line during the last 26 years, and found that the wealthy person cares little if the servant has to haul in coal and haul out ashes. The wealthy man looks more to the dollar and cent proposition, and if coal and wood are cheaper he will use them in his home. Under these circumstances the development of the gas business in that class of homes lies wholly with the servant. When you have taught the servant the economical use of gas you will find a broader field among the wealthy classes. I remember an instance of a gas consumer, whose bills for solid fuel would range from $10 to $15 a month, that put a gas stove in his kitchen and his bills for fuel gas ran from $30 to $40 a month. He said he was familiar with the fact that gas should cost less, but he could not make his old colored servant, whom he had for years, use it economically, and therefore preferred to do away with it.

The President—So far as lighting is concerned, the rich use little gas. Electricity is a luxury.

Mr. Keyes—Respecting the Barrett "jack," I have had some adverse experience with it. I bnught one for Stockton and one for Sacramento, and have found in a number of cases where we were putting in 1¼-inch or 1-inch service pipes that the moment the point struck a root or brick there was a tendency to divert the point, and we would find it about 4 feet deeper at the inner end than where we started, and so would have to take it out. Where the soil is soft, with no impediments in the way, it is a great saver of time and labor.

The President—Did you use a point?

Mr. Keyes—Simply a plug in the end of the pipe.

The President—You should have used a point. Did it have any effect on the coating of the pipe?

Mr. Keyes—We paint all our pipe with red lead and oil, and where we have pulled the pipe out again considerable of the surface paint had been scraped off.

Mr. Lowe—I am inclined to think that if you use a jack to force pipe, or if you drive it by any other means, the best thing to use as a paint is red lead; but under those circumstances the coating should be quite old. I think gas companies occasionally run across conditions under which they are compelled to force pipe, and for such use they should have on hand sections of pipe which have been painted for fully a year. The action of red lead paint is a chemical one in that it forms a cement on the pipe, but before it is entirely hard and tenacious it must be old. It will then stand a great deal of abrasion, but, of course, if the pipe comes into contact with hard surfaces and the friction is very great, any coating must be abraded.

Mr. Jones—I have been told that the best point is a small piece of pipe, allowing the earth to form its own point. That I believe will obviate some of the trouble had in the pipe turning aside when it meets small obstructions.

Mr. Pedersen—I was in Ventura some time ago and saw them using one of the jacks. They had a small attachment on the driving lever which gave a circular motion to the pipe as it was forced through, and they seemed to have no difficulty about the swerving of the pipe. I saw them drive 150 feet, going under a railroad track and out on the other side, and they were not half an inch out of the way. I thought it possible that this might be due to the circular motion of the pipe.

Mr. Gunder—I had some experience in the use of the pipe jack in laying 3-inch pipe for the Sunset Telephone Company, San Jose. The pipe did not vary an inch from the line. By using a cap we made the holes so large that the friction was cut down to a minimum.

Mr. Lloyd—I tried a point at first and had the same trouble that Mr. Keyes did. Then I had a round chisel made that set over the socket and tried to force the pipe, but whenever it struck a rock it either went down or up. I tried it on 2-inch pipe and it doubled up before we could force it. We had to abandon the jack and use pick and shovel.

Mr. Lowe—The value of the jack depends entirely upon local conditions.

Mr. Parker—We have used the jack in almost every condition of clay and gravel and succeeded admirably.

Mr. Hill—Respecting the question dealing with wrought iron purifiers, etc., I would like to ask what kind of paint to use on a purifier where the water seal comes.

Mr. Jones—I do not like to repeat this too many times. I think I began to talk about it in New England 20 years ago. I had similar trouble in New England and overcame it by using beef tallow and white lead. Place the tallow in an ordinary can, immerse the can in a pot of boiling water until the tallow is thoroughly melted. Mix the lead with the melted tallow and heat the pot containing the tallow and lead in this hot water while it is being used, and apply the melted substance to the side of the purifier covers while the material is still hot; never reheat it. Mix it in quantities as needed. It won't rub off, and protects the iron entirely against rust or the action of moisture. The moisture in the water seal never penetrates. The idea occurred to me by reading an account in the *Scientific American* fully 25 years ago of a lot of sugar machinery shipped to Havana. The ship was sunk. A wrecking company took up the machinery after it had been in the water a long time, and it was found to be intact. It had been coated with tallow and white lead before it left New York.

Mr. Lowe—I replied to the question having to do with the manufacture of crude oil water gas from oils of different gravities. A gallon of 14 gravity oil weighs roughly 8 pounds. A gallon of Coalinga oil we will assume weighs 7 pounds. We buy our oil by measure and use it by weight, and the oil that will give you the greatest number of pounds per gallon is naturally the best oil to use. Oil of less than 14 gravity is difficult to handle. The lowest gravity oil I have handled is 11½. Generally speaking, 14 gravity oil can be handled with reasonable ease, and under these circumstances it is to be preferred. Referring to the question as to how many gallons of water per hour should pass through a water gas machine, etc. In general, where water is scarce, as it is in some localities, or where you must buy your water, water used in gas washing and scrubbing can be re-used by having settling reservoirs. It greatly lessens the ultimate expenditure for water.

Mr. Hill—I would like to ask what effect the temperature of the water has. Is it essential that water be cooled, or would it make any difference if it happened to be warm?

Mr. Lowe—The colder the better the result. In your washer you might use warm water, but it is essential to send your gas from your apparatus cold.

Mr. Hill—Would you say that to use warm water would be of no use?

Mr. Lowe—It would be of less value than colder water.

Mr. Jones—If water is a very scarce article the hot water might be used for scrubbing and the gas afterwards treated with a smaller quantity of cooler water.

Mr. Jones—As to the inquiry about naphthaline, a question of that kind ought to be answered by the books in our library, and I urge the members of the Association to write to the Librarian for books on chemistry or physics which bear upon subjects they have in mind. Their requests for books will be promptly attended to.

A Member—Do I understand that the answer to the question about a meter and its registration at certain heights above the sea level is to the effect that a gas meter would register correctly regardless of temperature?

Mr. Jones—Yes. It will register correctly the volume of air, which weighs over twice as much as crude oil water gas. Still it may be used for registering correctly the number of cubic feet of air and the corrections for temperature and barometric conditions must be made by you in order to get the correct result.

A Member—If a meter were placed where the temperature was 95° and then the same meter was placed where the temperature was 76°, would not that alter the percentage of the meter?

Mr. Jones—I believe the gas does not remain long enough in the meter to affect the volume in passing through it. And the remedy at hand is to find a place for your meter where the temperature is as near the temperature of the gas as you care to sell it. Another thing, our old friend the "Gas House Devil" gets in when you put the meter where it is either hot or cold.

A Member—It is true that the meter should be set in a cool place, but there are cases where you cannot set the meter where the temperature of the gas and the temperature of the meter will be the same. We take the temperature of the water and the air to get the correct test of the meter. I should think the same would apply in taking the temperature of the gas and the temperature of the place where the gas had to pass through the meter.

Mr. Jones—That is important in proving a meter because we have inherited our ideas in regard to proving meters from our English friends. Of course, we all understand that the volume of gas stored in holders is affected by temperature; but the ground temperature at the average depth of gas pipes is below the atmospheric temperature in summer time in all of our towns, so that if the meter is placed in an ordinarily cool place the difference between that and the temperature of the ground would even up, so that you would not be selling gas in an attenuated form; and again, you would not be cheating yourself by shrinking the gas by passing it through a cold meter in the winter time. It passes through so rapidly that there is little effect.

The Secretary—We have had experiences which seems rather to upset the theory. Sometimes there is an installation of the main meter underneath the house in the basement, where it is reasonably cool, and from the house pipe would be taken a number of what we call "supplemental meters" supplying stoves placed in the kitchen, the meters being placed near the stoves and subject to a great increase in temperature. We have had very great differences—probably as high as 50 per cent.—between the total registration of the meters supplemental to the main meter and the registration of the main meter that fed them all. This difference in registration I attribute entirely to the drying up of the diaphragms of the meters due to the heat, thereby increasing the registration. These supplemental meters when taken out and tested oftentimes ran 50 per cent. fast.

Mr. Doherty—I do not think I ever attended a gas convention or talked to gas men when the questions of temperature and pressure have not come up regarding their effect on the volume of the gas. I would

suggest that one of the primary studies every gas man should take is a study of the law of Lussac or of Boyle. The first is that the volume of gas of given pressure will vary directly as the absolute temperature. The law of Boyle is that the volume of gas will vary inversely as the pressure, or the pressure times the volume will always equal a constant. If you have 1 cubic foot of gas under a pressure of 14 7 and you increase the pressure to 29.4 you will have half the volume you had before. If the gas man would familiarize himself with these two laws he would save a lot of puzzling problems that come up. Unless he has the laws at his finger tips he will often be puzzled.

Mr. Keyes--The experience of Secretary Britton has been similar to mine. I have a number of apartment houses where the gas all goes through one meter and is supplemented by meters in the kitchens. In one case we have 17 meters set in the kitchen, the gas going through one meter first, and I find considerably more money coming from these meters (they are of the pre-payment type) than the large meter registers. I accounted for it on the fact that the diaphragms must contract from the heat and therefore give a larger registration. I could not account for it in any other way.

The President—May not the explanation be that your consumers placed a quarter in the slot the day the meters were read?

Mr. Keyes—In reading the meter we read not only the money but also the amount registered on the meter.

Mr. Doherty—There is one answer in that Mr. Britton read regarding the calorific value of the heavier hydrocarbons which it seems to me should not go unchallenged.

Mr. Jones—I answered that question. Have you ever had any experience with the calorimetrical testing of acetylene gas. Acetylene gas to-day is very easily made from calcium carbide. It is used in automobile lamps and for a great many other purposes. It has a calorimetric value, theoretically, of 1,555 British thermal units to the cubic foot. In actual laboratory practice with a Junker calorimeter it is impossible to develop as many heat units from acetylene gas as it contains. I believe you can get about 1,200 units out of acetylene gas, showing that the calorimeter is a fallible instrument. Its principle is the burning of gas through a Bunsen burner adapted to the use of all gases. The answer to the question did not apply to the bomb calorimeter, where we get all the heating value of the substance experimentally. It referred to the use of gas in Bunsen burners, gas stoves and heating devices, or in any of our other forms of calorimeters such as the Junker. I received some data recently in connection with the use of gas in gas engines which said that gas diluted with either products of combustion or air would develop a horse power with 9,700 British thermal units, but that if acetylene gas is used with a proper proportion of air it requires 16,000 British thermal units to develop a brake horse power.

Mr. Doherty—I have measured acetylene gas with a calorimeter similar to the Junker, and have determined the value of acetylene gas, which as I remember shows a calometric value to exceed the elements; that is, showing it was exothermic in decomposition. Now I see no reason why the Junker calorimeter, barring a few chances for slight errors, should not give us the true measure of the total calorific value of our gas. I believe it is the best in the market, and I cannot see how we can get anything but the total calorific value of the gas, unless some products escape without being burned, and I can hardly conceive of any unburned products passing away from the Bunsen, especially if the gas used is a gas like acetylene or any of the gases having a low ignition temperature and a great affinity for oxygen. Now Mr. Jones refers to the effect of acetylene gas in a gas engine. I think that is due entirely to another reason. Take a gas and dilute it with some inert gas and you can run the compression up much higher, perhaps, than without it. Take acetylene gas and you have a gas with a low ignition temperature, and before you have compressed it to the extent you could compress a gas free from hydrocarbons you will reach the temperature of ignition. I think the reason for the considerably greater consumption of acetylene gas is that you cannot run your ignition up to an economical point.

Mr. Jones—The richer hydrocarbons in our gas which develop light are very unstable, and as you make these hydrocarbons heavier they become less easily oxidizable. They do not burn so readily. And in the Junker calorimeter, if you are using a gas like acetylene where the air supply is not exactly the correct amount, proper oxidation of the gas does not take place, and the result is a deposition of solid carbon somewhere. I believe this is true in a gas engine. I believe that in internal combustion engines we would not get the true value of either benzine vapor or naphthaline.

The Secretary then read the

"Report of the Special Committee on the President's Special Report on the St. Louis Gas Congress."

After a lengthy discussion thereon the following resolution was adopted:

"That this Association instruct their President to appoint a committee of two to confer with the representatives of the other Associations, but that the committee is not in any way authorized to bind the Pacific Coast Gas Association, and that such affirmative action can only be taken at the next annual convention."

Mr. Jones handed in the following:

Report from the Nominating Committee.

Mr. Jones—As chairman it gives me a great deal of pleasure to have the honor of presenting in nomination the names of Mr. L. P. Lowe and Mr. John Martin and of these other gentlemen, because Mr. Lowe and Mr. Martin have done so much for our Association. Mr. Lowe is my dearest friend, and Mr. Martin we all love and admire. I consider it a great privilege and an honor to be the Chairman of your Nominating Committee.

Election of Officers.

On motion, duly seconded, the Secretary was instructed to cast the ballot of the Association in accordance with the report of the Committee, and the Secretary thereupon announced that the ballot of the Association had been cast as follows: For President, Mr. L. P. Lowe; for Vice-President, Mr. John Martin; for Secretary and Treasurer, Mr. John A. Britton; for Board of Directors, Messrs. Frank J. Symmes, Christian Froelich, W. B. Cline and Frank A. Cressey.

Some Responses.

Mr. Lowe—Last year when I was elected Vice-President I made a few remarks. I am not going to do any more now than to thank you for the honor, because it is a great honor for any man to preside over any of the Gas Associations of this country, and especially over the Pacific Coast Gas Association.

Mr. Martin—Mr. President and members of the Pacific Coast Gas Association: I thank you very much for the honor you have conferred upon me, and I will try in every way to prevent the disbanding of the Pacific Coast Gas Association and at the same time co-operate with brother Doherty in trying to build up better work in all the Associations.

As to Change of Time of Meeting.

Mr. Lowe—May I be permitted to make a few remarks on the change of date? Those of us who attended the last meeting of the Association are well aware of the fact that for the first time we missed the face of our brother, Mr. Jones. The reason was that he was taking a much needed rest and vacation. Had it not been for the death of a member of Mr. Martin's family we would have missed his face this year because of the fact that he also was about to take a vacation at the time when the session of the Gas Association is held. You are all undoubtedly aware of the fact that Mr. Martin's mother-in-law died while they were on their trip to Alaska. It seems to me that a vacation season is not the right time to hold a gas convention, because a great many men must necessarily be away with their families, and if they attend the session of the Association they must to a certain extent sacrifice the pleasure of the vacation times. I think it would be better if we held our session later in the year. Mr. Jones told me that when July was originally chosen it was because the columns of the gas papers were open for our proceedings, those of the other Associations not interfering. If we held our meetings in September, the same conditions would prevail. We would have passed the vacation season, and I am of the individual opinion that it would be more convenient for the members and that we would have a larger attendance. I do not know whether there is anything in our by-laws to interfere with a change of date; but if not I move that the proceedings of the Association hereafter be held at some time during the early part of September—probably the second Tuesday—as we now have our meeting on the second Tuesday in July.

Mr. Jones—I have heretofore opposed the changing of the date of meeting of the Association. In the early days of the Association, July was selected because San Francisco was at that time of the year the best summer resort in California. In selecting the date Mr. Crockett and I considered the climatic conditions existing in other parts of California where the mercury gets out from the top of the thermometer. I found that a great many of our inland friends liked to come to San Francisco in the summer time to cool off. But since that time I have entirely changed my views, and before this discussion goes any further I want to withdraw the objections I previously had to changing the date of the meeting. I believe, with Mr. Lowe, that many members feel they would

like to have the date changed. September is a good month. The fixing of the date in July was simply a matter of sentiment. I feel that the members should consult their own interests now in selecting a proper time of year for the meeting. What Mr. Lowe says in regard to the columns of the gas journals is true, because the meeting of the Western Association in May keeps the gas papers busy through May and June, and the American meeting in October keeps the journals full for October and November and sometimes December, so that if we had our meeting in the early autumn we would have the same advantage we now enjoy of having a proper reporting of our proceedings.

Mr. Martin—I was very greatly surprised at the selfishness of our newly elected president. He wanted the honor of being president 14 months instead of 12. (Laughter.) Now, as a matter of fact, I think the time of meeting as we now have it is the most convenient time of the year for the members from the interior gas companies. It is a time of the year when the majority of the people in their respective towns are away on their vacations, and when they have comparatively little to do. September is the beginning of their winter season and they have more to occupy them and less time for attending meetings. The trip to San Francisco in the month of July is more welcome because of the greater change, and while two or three of us may be absent from time to time, yet the interest is always maintained and I believe that you have a better attendance in July than you would in September. I hope that the members will think it judicious not to change the time of meeting—or rather, the month of meeting.

Mr. Keyes—I for one agree with our friend Mr. Lowe. So far as climatic conditions are concerned, I think we have in the interior, if anything, severer weather in September than in July, and so far as the ease of getting away on account of business conditions is concerned, it would not interfere more in September than in July. I am very much in favor of changing the date to September, and I would, therefore, second the motion of Mr. Lowe to have our meeting on the second Tuesday in September, if it does not conflict with our by-laws.

Mr. Lowe—I want to say, gentlemen, that this is a matter which touches everyone of you, and it may be that you should not be called upon to decide hastily, and if some member will offer as a substitute the appointment of a committee to confer with the members, giving the committee power to change the date if they find it advisable, it would be quite as acceptable to me.

Mr. Hill—It seems to me that this is not a very bad attendance for this time of the year, and I quite agree with Mr. Martin that this is the best season of the year for our meeting. The Association seems to prosper holding its meetings at this time of the year, and, living in the country, I find it quite convenient to combine business and pleasure. I can run down here and have 3 or 4 days of a good time and at the same time learn a great many things pertaining to business affairs. I for one would be quite in favor of keeping the meeting where it is.

Mr. Jones—Perhaps the fact that the schools are open in September may have something to do with it. Don't you go to school, any of you?

Mr. G. P. Low—I have an axe to grind. With all due respect for the opinion of Mr. Martin, I make this statement: As editor of the "Journal of Electricity, Power and Gas" I can extend the assurance that if the meeting of the Association is held at some time other than July, I can pledge you that the entire proceedings will appear the first of the coming month. In July that is impossible on account of the meeting of the Transmission Association. In the middle of September it would be easy to bring out the transactions.

The President—I may say, speaking personally, we will all have to make sacrifices, but I assure you I come here every July, and the sacrifice I make personally in order to have the privilege of attending the meetings is very great. I ought not to come from Spokane in July. It is the warmest month of the year, and a great deal of work has to be done during my absence that I can keep in touch with only by the use of the telegraph. I am in accord with the sentiment expressed that we should change the date of the meeting; that is, if the by-laws will permit, which I am sure they will. But I am with the boys all the time, and if you do not think it wise to change the date from July, July is good enough for me.

Mr. Doherty—I don't want to butt in on things here, but by request I offer as an amendment that a committee be appointed to canvass the sentiment of the members and be given power to change the date to the time suggested by Mr. Lowe.

Mr. Lloyd—I offer as a substitute for the whole matter that the proposition to change the date of meeting be laid over to our next meeting. I do so for this purpose, that it will give the members of the Association a chance to see how they can shape their business for September if we desire to change the date to that date. We know now that we can attend the meeting in July, but whether our business will permit of our leaving it in September is another question.

The President—I think you misapprehend the purport of the amendment. It is that you shall be conferred with during the ensuing year. We shall take no action until the committee has reported.

Mr. Lowe—Let us assume that two-thirds of the members by a postal card vote, or something of the sort, desired to change the meeting. The committee I am sure if there were one single vote in favor of continuing the meeting in July would continue it.

The amendment was carried *viva voce*, and the original motion, as amended, was then carried.

The Portraits Presented by Mr. Lowe.

The President—I think it proper, gentlemen, to make it known to you at this time, on the introduction into office of Mr. Lowe, that these portraits of the Past-Presidents of the Association, so elegantly framed, are the gift of our newly-elected President. They will hang in the office of the Secretary of the Association until our next meeting.

The Secretary then read a letter from the Union Irom Works inviting the members of the Association to be present at the launching of the cruiser "South Dakotah;" also a communication from the "Journal of Electricity, Power and Gas."

On motion of Mr. Martin the thanks of the Association were tendered to the Union Iron Works for the kind invitation.

The President announced that the next papers were on a short topic, entitled,

AMERICAN VS. BRITISH GAS RANGES,

arguments on which had been contributed by Mr. A. S. Main, of Glasgow, Scotland, and by Mr. C. S. Barber, of London, England. He regretted that Mr. Trenkamp, of Cleveland, O., had found it impossible to prepare the paper announced on the programme, but that Mr. Henry C. Keyes, of Sacramento, has kindly consented to write on the subject at short notice.

The Secretary then read the papers, by Mr. Main and Mr. Barber successively as follows.—Mr. Main:

As our purpose in this paper is to contrast American with British gas ranges, it will be well in the first instance to describe briefly what we consider the typical gas cooking range of each country.

The popular American gas cooking range is constructed with a baking oven on top and a roasting and broiling oven underneath; in the latter oven cooking is done by deflection from a gas burner placed on the top of the oven. The heat from this burner circulates round the outside of the baking oven placed above, so that the one burner does double duty. It is important to note that the products of the gas do not enter the baking oven, but simply circulate round the casing of same.

The typical gas range used in Great Britain is constructed with a large roasting oven, varying in height from 20 to 30 inches and 10 to 24 inches in width. The gas is consumed in Bunsen burners placed on each side of the oven, and as close as possible to the bottom of the same. On the top of this oven is a separate hot plate with boiling rings and a broiling and grilling arrangement. The bulk of the ovens made in this country and hired out by gas companies are constructed of enameled steel plates inside, with an outer casing of enameled plates, or cast iron, the space between the outer and inner casings being packed with non-conducting material, which greatly economizes the gas consumption and gives better results in cooking. The American style of stove was made in Great Britain many years ago, but has been practically discarded in favor of the present system. Regarding the superiority of the British range:

1. The oven is better adapted for roasting meat, owing to the direct action of the heat on the joint and the constant current of fresh air which is drawn in at the bottom of the stove and continually passing round the meat in the oven. There is obtained in this way, owing to the excellent ventilation and the constant air currents, the nearest approach to the old method of roasting before an open fire. In the American stoves the joint is baked and not roasted, and as the oven is entirely closed there is a lack of ventilation which we in this country consider so desirable for good and wholesome cooking.

2. The second point in favor of our British oven is due, we believe, to the fact that the products of combustion of gas, consisting of water, vapor and carbonic acid gas, are inside the oven. We believe that this moist heat gives better results in roasting and the juice is better preserved in the meat.

3. We consider by our method of constructing one large oven we obtain greater economy, as with the same consumption of gas we heat the large oven in which quite a variety of food can be cooked. In the lower portion meat can be roasted or a meat pie baked; in the center of the

oven fruit puddings or pies can be cooked, and on the top, bread, light pastry or fish can be baked. It may be thought that the mixing of flavors by the cooking of such a variety of articles in one oven would not give good results, but it has been proved by frequent tests that, no matter how diverse the nature of the food may be which is cooked in these ovens, there is no absorbing of flavors by the different articles. Onions and light pastry have been cooked at the same time without the one tainting the other.

In the American oven, supposing grilling, broiling or toasting of bread is to be done, there is no doubt that the lower portion of the cooker will do this work very effectively, but it is seldom that one wishes to broil or toast and bake in an oven at the same time. Consequently there is a considerable waste of gas as compared with the British oven. In the British oven the broiling or grilling burner is placed on the top, and the same gas which is used for toasting bread will boil the kettle or fry fish, bacon, etc. One can readily see that, in the ordinary requirements of a household, boiling water, frying, toasting and grilling are more frequently demanded than anything else, and these are more effectively done on the British ovens than on the American.

There is no doubt that many people have a prejudice against the internally heated gas oven, but we think a little consideration will show that this prejudice is founded on ignorance of the true nature of the process, both of the combustion of gas and of cooking food. We must bear in mind that meat in process of cooking is always exuding its juices and not absorbing. The late Dr. Stevenson Macadam, F.R.S., F.I.C., F.C.S., Chemist to the Surgeon's Hall, Edinburgh, some years ago, at the request of the North British Association of Gas Managers, devoted special attention to the question of gas cooking, and as a result of his prolonged tests gave it as his verdict:

"That the wholesomeness of meat cooked in gas ovens must be regarded as beyond doubt."

Dr. Steel, of Guy's Hospital, London, said:

"In gas cookery the juices and fat, instead of being separated as in the ordinary process, become thoroughly incorporated with the meat; a point of great interest in a nutritive as well as a commercial sense."

Dr. Macadam further stated his experience of gas cookery:

"That the osmazone of flavoring matter was better preserved in the meat when cooked in a gas oven than when cooked in a coal oven."

As we have stated above, the products of gas combustion consist practically of water vapor and carbonic acid gas, and it is a singular thing that people who will cook a chop or steak over an ordinary coal fire or on a coke grill, and consider it the best of all possible means of cooking, would object to place a joint in an internally heated gas oven. Now we know that in the gas oven the meat is subjected to the influence of the same products as the chop or steak cooked over the gas or coke fire, with this exception, that the coal gas used in the gas oven is purified of sulphur, ammonia, etc. Some who object to the presence of carbonic acid gas forget that in the coke grill, which is considered the most perfect means of grilling, the meat is surrounded by carbonic oxide gas (CO), much more deadly than carbonic acid gas. People who habitually drink sparkling waters (which are filled with carbonic acid gas) seem to have a fear of the same product when applied to meat, though, as we have pointed out above, meat in process of cooking does not absorb, but is continually giving off its gases. It seems to be overlooked that while an excess of carbonic acid gas is no doubt harmful to the respiratory organs, in moderation it is rather beneficial for digestive purposes.

With regard to the matter of ventilation of the ovens, I am quite confident that we are on the right side, and that, for the roasting of meat especially, a canstant current of fresh air is very beneficial. In the American stove the outer casing must get very hot when the stove has been in use for some time, with the consequent result that a great deal of heat is radiated from the stove. This is obviated by our system of packing the cooker, which not only keeps the outside cold but economizes the gas. We made a test some time ago of a single cased cooker against a packed cooker and found the saving of heat to be nearly 40 per cent.

Regarding the difference in cost, I think this is due to the different ideas entertained in Britain and America regarding most manufactured articles. In America the idea seems to be that articles should not be made to last too long, as new inventions are constantly coming into the field, whereas we have the idea to supply a substantial article with long life, and our cooking stoves are now made with cast iron exteriors and enameled interiors, and should be as good in 20 years' time as they are to-day, provided reasonable attention is paid to cleanliness.

Mr. Barber:

I have studied with no little interest, the kind of gas cooker which finds acceptance on your side of the water, and, if I may be permitted to say so, in this matter the Americans do not appear to show their usual spirit of go-ahead-ism, if the illustrations you have sent me are representative specimens of your up-to-date gas cookers. I will venture, therefore, to back up my statements with a few remarks by way of comparing your cooker with ours.

The form or general principle of a double oven of your kind was adopted by some makers years ago in the infancy of the trade, but was discarded in favor of the single oven of similar capacity. The reasons for this were:

(*a*) The inconvenience of having the joint down so low, with the trouble incidental to stooping.

(*b*) The fact that the joint being so very near the burners it had to be constantly watched, taken out and cleaned, which had all to be done in a most uncomfortable position.

(*c*) Restricting the area so that only moderate sized joints could be cooked, whereas you can hang a very large one in the single oven.

(*d*) In the matter of gas consumption, there is no doubt that this was *far greater* for a given result in the old style of stove than in the new.

(*e*) *Bread and Pastry Baking.*—You cannot get the top heat so essential to bread and pastry baking in the upper oven, which will always be hotter at the bottom than at the top.

(*f*) The upper oven is surmounted by a chamber through which the air circulates. Now, this air is always saturated with particles of fat which forms a deposit inside, and which cannot be got at for cleaning purposes, and so is apt to cause an unpleasant smell.

Apropos of the above, I believe this form of construction was originally followed under the erroneous impression that meat and pastry could not be cooked together without the flavor of one being imparted to the other.

Construction.—I am not quite sure from the diagrams, but I believe you have not adopted our double cased and packed system throughout the stove doors, sides and tops, so that I am sure you lose much heat by radiation.

Durability.—Then again I cannot see how your type of cooker can have a very long life, as the gas fumes will soon eat into the casings of the stove. For this reason we enamel our internal casings, and in our very latest patterns we make these enamelled plates removable; they can then be easily cleaned.

Hot Plates.—I notice that your patterns have extended hot plates, which are, however, only partially fitted with burners. On ours we increase the number af burners.

Burners.—We consider your burners have been specially designed for the collection of dirt and grease, causing them not only to choke, but the burnt accumulation to become offensive.

Before reading his paper Mr. Keyes said: The only basis for the comparisons which I am about to make, as far as the English stove is concerned, is the range which you see in the rear of the hall. I was not requested to write this paper until the night before last, and as this range is the only one of foreign make I ever saw, of course I can only give you such impressions as I have formed from examining it, so I hope any criticisms I have written will be accepted by the writers of the other papers (should they happen to see them) in the same friendly spirit in which they are made.

Mr. Keyes then read, as follows:

Not having been requested to read this paper on American versus English gas ranges until the eleventh hour, I have not had sufficient time to make any extensive inquiries or investigation relative to gas ranges of English manufacture, and I am, therefore, unable to take up this subject in as detailed and thorough a manner as I should like to. However, from what I have discovered of the various features entering into the construction of gas appliances manufactured abroad, and so far as I can determine from such information as I have been able to secure, I should certainly say that the American manufactured gas range is so far in advance in every respect of the average gas range of English make as to hardly admit of comparison.

In the first place, I consider American made gas ranges far superior to those of English manufacture in both general construction and appearance. When compared side-by-side the English article seems a very crude and cumbersome affair, as it is constructed throughout of very heavy castings. Furthermore, no allowances whatever have been made for producing lightness of weight in those parts which, to secure the best results, must become heated throughout quickly. It is very evident that it must take a great deal more gas to heat such a range through than it would to heat similar portions of an American range of the same size, and this also results in a needless waste of fuel. It

seems to me, considering the amount of space which the English gas range takes up, it has not nearly the capacity of the American manufactured range. Our ranges have the broilers underneath the baking oven, and one set of burners heats both ovens, thus making it possible and practical to broil and bake at the same time, and with a much less consumption of fuel as well as work than would be necessary with the average English range. Again, the manufacturers of English gas appliances do not seem to be far enough advanced in their general knowledge of the proper mode of constructing such appliances, in so far that they do not incorporate in their construction numerous small features that are of great practical value, and all of which are found on the average American gas range.

On American gas ranges the spring balance drop doors have been adopted, whereas the average English gas range is gotten up with a swing door fitted to the front of the range with very large, clumsy looking hinges of not very pleasing design, and fastened by means of old-fashioned handles or catches.

Furthermore, the top burners on the American made range are distributed in such a manner as to secure the greatest possible utility in using a variety of different sized cooking vessels on them at the same time, whereas the average foreign range has the top burners so arranged as to make necessary the use of certain sizes only of cooking vessels in order to avoid rendering certain burners useless for the time being.

One of the main features on a gas range is the burner or valve, and in the construction of the English ranges we find that the old-style, cored drilled burners and the old-style lever valves are still employed, whereas on our up-to-date ranges we have the removable cone burners and the adjustable needle valves. While some ranges of English make are fitted up with such improved features as oven lighters and simmering burners, nevertheless these are not nearly as late in construction as those used on American made ranges. Furthermore, I consider the adjustable air mixer on the domestic gas ranges one of the most valuable and important adjuncts and far superior to the stationary affairs used on English ranges. And still another important feature—the American gas range can be purchased at about half the cost of an English gas range of similar size and style.

Last, but not least, we must take into consideration the matter of finish and appearance, and while our American gas ranges are of handsome design, nicely proportioned, and fitted with ornamental nickel trimmings and nickel plated valves and valve strings highly finished, we find the average English gas range is a very plain looking article indeed, having just a plain black stove finish, with perhaps here and there a nickel knob or perhaps a nickel name plate.

Discussion.

The President—I feel sure we need not apologize for the brevity of these papers, as the mere announcement of such a topic has brought from the East our two friends, Messrs. Roper and Kahn, who I am sure are able to take care of their side of the question. In order that the members might intelligently discuss this question I ordered an English gas range, which is in the Novelty Department, and which undoubtedly you have all inspected.

Mr. Lowe—I should like to ask Mr. Keyes about the price of the stove. He stated that the English stove costs twice as much as the American. Do you mean the imported arlicle?

Mr. Keyes—I understood from the President that the cost of that stove was somewhere in the neighborhood of $25, and it is about the same size as the American stove alongside it which costs about $13.

Mr. Lowe—Do you mean in this country, duty paid?

The President—The cost of the stove in England is about $25.

Mr. Martin—I will not attempt to go into the details of stove manufacture other than as applied to our conditions. I have no doubt that our stove manufacturers will concede that an insulated interior will give greater effectiveness than one not insulated, which is an advantage from the standpoint of a smaller gas bill; but on the other hand it is a disadvantage which we appreciate especially in our smaller towns in the winter time. The greatest difficulty we have there is to get the people to use their stoves in the winter for the reason there is not heat enough given off for the comfort and convenience of the person who does the cooking. In consequence they use coal or wood stoves during the winter time to a greater or less extent. The inefficiency of an American stove from loss of heat by radiation is not as great from a practical standpoint in our towns as it would appear to be. I am inclined to think that the character of the baking that could be done in one of the English stoves would not be as good as that in the ovens designed for baking in the American stoves, for the reason that you don't get the same application of heat and cannot get the uniform baking quality. The durability of the English stove is quite evident; but, on the other hand, those managers who have watched the progress and development of the American made gas stoves, and particularly those managers who have pursued the policy of renting stoves at so much per month, will remember the fact that, in one or two years with improvements coming out, old stoves become practically junk because people wanted the latest improvements. There is such a thing as having a stove that will last too long. It is better to take the difference in cost and deposit it in the savings bank, and by the time you are ready for another and more modern stove you will have money saved to buy it.

The President—We should like very much to hear from Mr. Roper.

Mr. Roper—I am not prepared to discuss the question. I did not know what the gentlemen were going to say. I think, as the gentleman here remarked, our English friends wrote their papers after looking at a catalogue, and our friend here criticized the English made stove after seeing one—about 30 minutes—so I don't think either one is right. As to the English stove, there is no question but that it would be very fine in roasting—at 85 per cent. more consumption of gas. You could do as good roasting in the ordinary type of American stove as in the English; but you don't. If you roast in the lower oven and baste your meats frequently you will have exactly the same results as in the English stove. They have servants there, while in this country a kitchen girl runs the house, who does her work in the easiest way. In one case you bake the meat, in the other you broil it. So far as ventilation is concerned, they certainly have all the ventilation they want in the English stove. They get all kinds of ventilation; they carry a current of air through all the time, and the more air the more gas they consume and waste. In regard to the English stoves being packed with asbestos and having great, big, heavy plates, the writer forgets that the air space in the American stove is worth more to us than mineral wool or asbestos. An American made stove to-day has an outside jacket, a sheet of asbestos, another jacket with an air space, and then an inside lining. I do not think there is a first-class American stove manufactured to-day but that the valve, instead of being a blunt end of pipe, is built more on the injector principle and then spread after the gas has passed so far. And we spend lots more money on valves and cocks than they do. I do not think I had the pleasure of using an English stove; but I had the pleasure of meeting an English manufacturer once, and I had not been introduced to him more than 2 minutes when he told me that he had come over here to build gas stoves. Would I sell out? Unfortunately he was killed in an automobile accident; so we were saved that much competition.

Mr. Kahn—The gentleman who preceded me has so fully covered the ground that there is very little left to say about the lawsuit that is being defended (and which I am justified in describing as a lawsuit because of the form in which the question was printed). I do not think that the English critics have been as generous as they might have been if they really understood the facts that they should have known before they entered upon a discussion of the differences between the two forms of stoves. They manifestly discuss our gas ranges from the standpoint of an Englishman, very much like the other Englishman who came over here, and after remaining for a week wrote a long history of American social conditions. The conditions in England I have no doubt are such, Mr. Chairman, that the gas range as it is built there, responds to the requirements of England and of Scotland and of Ireland very well indeed. A great many gas companies over there are owned by the municipalities, to begin with, and then a great many other gas companies find it necessary to rent out gas stoves before they can get the people to use them. In that respect, Mr. Chairman, the English gas fraternity has undoubtedly furnished an example that the American gas fraternity might adopt with a great deal of benefit and profit. They require a first-class and durable stove. They desire to consider every stove put out under lease or rental a permanent asset of the company. The result is the life of an English stove is much greater than that of any American stove of which I have personal knowledge. The conditions of climate in England, the damp, humid and saturated air of the British Islands, contribute very largely to the destruction of sheet steel. (This also occurs in this country.) For those reasons they found it profitable and wise to adopt the form of range that they did. The necessity of cleaning up their ranges and scouring them after they came back from use, and the preparation of them to put them out into service again made very desirable the introduction of the interior porcelain plates. It is a good thing, and in that respect we in this country could profit, and ought to profit. But unfortunately the conditions in America are wholly unlike those in England. And I want to say, before I pass from the subject, that the English gas stove makers, so far as I know—notwithstanding the splendid enterprise of the English

manufacturers in general, occupying as they do almost every market of the world—have made no impression at all upon the gas appliance trade of the European Continent. They sell a good many things in Europe, but they have not succeeded, so far as I know, in selling any English gas stoves. I speak somewhat knowingly on the subject because three years ago I made it my personal pleasure and business to investigate the gas appliance business in Europe, visiting a great many gas companies on the Continent and nearly all those on the British Islands, and found no gas stoves made in England anywhere on the Continent. I did find a large number of American stoves on the Continent, and there are a large number of American stoves going to the Continent all the time, and I believe that, as between the American and the English stove, the Continental gas engineer prefers the American, not only because it is cheaper but because it is also more practicable. Yet the American gas stove does not possess the qualities for the European household that it does for the American household, for the reason that the European household very rarely deals with the baking proposition. The European housewife goes to the baker. But while the baker thrives in this country, we still get away with an enormous quantity of home made pies and an enormous number of good, old-fashioned American biscuits, and I imagine that the majority of American families would consider it a great calamity if the art of making biscuits were totally lost. I am sure that the gas range as built in this country has promoted the fancy, as well as the appetite, for biscuits, and I believe it has robbed the biscuit of the serious objection some wisacres some time ago made against it that it was detrimental to the maintenance of a good digestion. The American biscuit today is a very toothsome and a very useful adjunct to the American household. whether it be a rich one or a poor one. The English gas range is not capable of doing that class of work. The American gas range does it splendidly. I daresay there are very few gas ranges made in America of any standard quality that are not capable of producing as good a pan of biscuit as one could wish in from 5 to 8 minutes, doing them to an absolute perfect brown and making a splendid biscuit, and doing it upon considerably less than 10 cubic feet of gas—considerably less than 5 feet—if your stove is already heated to the desired temperature. We build in America a range that is nothing more or less than an evolution, a complete and thorough application to the wants of the American household. As a manufacturer I would say that the American gas company manager could very well with much advantage (I won't say with any advantage to the manufacturer) sell a better grade of stove. It has been a hard and thankless task for the manufacturer with any ambition to produce a first-class article to find no ready response from those whose business it is to buy the appliances that the American manufacturer could produce if he only could find a customer to buy. I am confident, gentlemen, knowing the stove business as I should (having been identified with it since my childhood) that the American user is ready to buy a better range than you have been offering him. He would be glad to pay for it. I believe American gas companies have grievously erred in assuming that a difference of $1, $2 or even $5 in the price of a stove would militate against the adoption of fuel gas in the average American family. The American consumer is now buying a gas range at less than one-third the price that he has been in the habit of paying all his life for a not extraordinarily good coal range. They pay from $35, $40, $50, even as high as $75, if they want an apparatus of the latter kind, and the average gas range should outlast any coal or wood range or stove that can be bought anywhere, if the user will take ordinary care of it. I wish to express my sincere hope that the Pacific Coast Gas Association, which is so enterprising in other things, will furnish an example by the adoption of better ranges than they have been using heretofore, for the reason that it would inure wholly to their advantage. The gas appliance manufacturer is nothing but a very weak leaf which is blown through the air at the will and at the beck and at the call of those who buy his product. There are very few of us who are not able to produce a better stove, and who do not fully understand what ought to be produced, if we could only get people to buy and pay the cost, with a small amount of profit, which of course the manufacturer is bound to have. We can make whatever you require, and I imagine if you insisted on our furnishing a stove that would cost less than those you are now buying it would be produced. We are like the dressmaker who listens to her customer and puts on a green ribbon here and a red ribbon there and a little lace here, if the lady desires. That is substantially what we have to do. If we have made any progress at all in the manufacture of gas stoves it has been due solely—as my friends here who are also in the manufacture of stoves will bear me out—to the exactions of some of the buying agents of the more "enterprising" gas companies. They have demanded this and that. I believe these gentlemen have demanded changes from time to time largely because of their own experience. I have in mind that in a certain city it was found the cost of looking after the ranges that were in use amounted to an enormously large amount a year—I believe it ran up as high as $2.25 a stove, they undertaking to look after all gas appliances. They found shortly after that one of the chief causes of this trouble was the burners would rust and fill up, or that the cocks would leak, or that the orifices of the valve would fill up, and that there was imperfect combustion. In order to remedy these things they had to take the whole thing apart. They then demanded adjusting valves and separable burners, and they submitted to us what seemed an impossible proposition, to make a separable burner that would furnish an absolutely efficient fire and that could be separated and cleaned out as readily as you could clean the dirt off your hand. The thing was done. In like manner we furnished a valve—some of us did; some of us failed—that would give them a thoroughly efficient fire, notwithstanding the presence of a needle valve in the center of the valve orifice. I have brought a sample of each of these things with me. I think I am safe in saying that, after the adoption of these little devices, according to the assertion of the engineer in charge of that department of the gas company, whereas previously their men could take care of only 2 or 3 stoves a day they are now easily able to take care of from 14 to 20. In other places they do not care anything at all for these devices. I don't want to take too much of your time, although there is a great deal that might be said on the subject, but in concluding I would simply repeat that we have nothing to learn; and I do not like to take the English statement, even though we usually can learn from those who know less than we do. There is a great deal they can't teach us, simply because they do not know the domestic, family conditions of the United States. There is a great deal on the other hand that they can learn from us, and I would say to our English cousins, unless they are exceedingly careful, they will find it will not be very long before they will be glad to take up the manufacture of American types, if they care to preserve their trade.

Mr. Doherty—Many of the problems connected with the relative values of these stoves seem to be treated as matters of opinion instead of matters of demonstration. What we want in ovens is uniformity of temperature and economy of heat, and such questions as these do not lie within the opinion of any man; they are simply matters of demonstration. Many of the statements made in the English papers I do not thing are in accord with good engineering practice. They speak of "moist heat," and one of them speaks of moist heat in an oven. As far as I know, heat is not subject to carrying moisture itself, and the writer probably meant he was producing more or less water vapor and carrying it through the oven chambers. Now as that vapor is superheated it would behave as a permanent gas, and the drying effect would be the same as if he had a permanent gas instead of a superheated vapor. He makes another point about not drying up the meat, and then tells you about the immense currents of air. This it seems to me is inconsistent, because if he were loading that air with moisture the more air he put through the more he would dry his meats. I am rather out of sympathy with any sort of combination appliance (broiler, baker and toaster, or what not), because as a rule you want individual control. You don't want the same amount of gas consumption for your baking and your broiling. The English criticisms offered on the arrangement of the broiler at the bottom I am in sympathy with, and I do not think anything less than the continuous pushing of the kind of stove we now sell would have made it possible to find a market for it. I think eventually we will have to come to a high broiler. I do not believe the broiler is used as much as it should be, simply because it is in an inconvenient location. Mr. Martin advocates radiation from the stove. I do not advocate radiation, even for the conditions prevailing here, and I would not advocate it in the East. One of the greatest advantages of the gas stove is that it keeps the kitchen cooler. If it is desirable to get heat it is a simple matter to open the broiler door; and it is always possible, if you have your stove well insula ed, to let some heat out into the room, and if it is not insulated you cannot keep the heat within the stove. The English writers speak about radiation as though that were the only heat loss. The big loss is not in radiation but in the heat carried off in the products of combustion. I think 75 per cent. of the heat value of your gas goes through the flue, even in your American stove. It is over-ventilated now. Mr. Kahn rather advocated the plan of renting stoves in America. I do not believe the plan is very successful, and I do know that stoves can be sold if they are pushed aggressively, and that the present price of stoves puts them within reach of practically everybody. When you sell a stove you have a permanent consumer, and the cost of the time of your salesman

and your stove man is about as great for renting a stove as for selling it. A great point has been made for English stoves on the score of durability. We constantly have stoves brought in for repairs that have been out 20 years; besides this, the point Mr. Martin makes about paying less for the stove and putting the money thus saved out at interest is an excellent one. Durability beyond a certain point is rank extravagance; and I think this is so of the English gas stove if applied to American conditions. We could better afford to buy more stoves; and the total charge per year against the American gas stove would be less in spite of the asserted durability of the English stove of which I know nothing. It might be of interest to call attention to the fact that one American manufacturer did manufacture the English type of stove and abandoned it because it was not suitable to our needs. One of the objections to the English stove is the lack of uniformity of temperature in the oven. Now what I said before was intended simply to put in a plea for better Association work. As an example: The Ohio Gas Light Association has tried to outline standard methods of testing fuel gas appliances. It has changed them from time to time with the hope of eventually getting a perfect method; but, as far as I know, no attention has been paid to the work of the Ohio Gas Light Association by any other Association as an Association. Some work has been done by individuals; but co-operation in work of this kind ought to exist between gas associations. Perhaps the methods outlined by the Ohio Gas Light Association are very poor. If so, it is up to the other Associations to find some better methods, and instead of taking a great deal of time to discuss the relative value of these stoves, as though it were a matter of opinion, we should adopt standard methods of measurement. Anyone can now use any method he likes and get any result he likes.

Mr. Kahn—I merely want to correct Mr. Doherty's reference to a statement I made. I did not advocate the renting of ranges, nor did I oppose it. I merely referred to a case where they found it desirable to rent stoves and where these rented stoves, because of the fact that they were rented, received very poor attention and were necessarily brought to ruin in much less time than would be the case where the parties owned the stoves.

Mr. Lowe—I would like to ask Mr. Kahn how he would improve the American stove. Yon say that we should buy a better stove and that the manufacturers are ready to sell us a better stove. To what extent could you improve a stove at an additional cost of $2 or $3?

Mr. Kahn—I should personally prefer (though I know that I may have a lot of bricks thrown at my head for saying it) an all cast stove to a sheet steel stove.

Mr. Lowe—Because it would be economical?

Mr. Kahn—I believe it is better in all respects, especially as compared with such a sheet steel construction as is generally called for now. I would have heavier gas supply parts, and more threads on the valves to make them stiffer; and I would do some other things that I consider somewhat better—but they are trifling and not necessarily important in determining the quality of the range. But that is the principal idea in my mind, to make an all cast range in preference to a sheet steel range.

Mr. Lowe—It ought to make a more substantial stove. Do you consider the enameled ovens an advantage over the black ovens?

Mr. Kahn—Decidedly so, although it would be done at the expense of economy of fuel consumption. You cannot take a light sheet steel plate and get along at all in enameling it. You would necessarily have to use a heavier plate than is now used and it would take more gas to heat it.

Mr. Lowe—Would the consumption of gas be increased for any other reason; for instance, in the way of radiation of heat?

Mr. Kahn—I do not think you would lose anything on that account.

Mr. Lowe—We are all familiar with the appearance of the English stoves because many of us subscribe to the English "Journals," but generally we know nothing of the German and the French stoves. How do they compare with the American stoves?

Mr. Kahn—The French stove is built very much on the order of the original American stove. Possibly it would be better to say that the original American stove was a copy of the original French stove. The French stove was brought over here first by the late Mr. W. W. Goodwin and possibly some other residents of Philadelphia. It was, as you remember, a stove with a baking oven on top and a grill underneath. The grill was open. That was really the beginning of the evolution which has produced the American stove. They still continue in France to make a stove of that type. In Germany they are copying our American stove, to a great extent if not absolutely. They have a very high opinion of American productions. They do not hesitate to buy our castings and file them up. Our English friends have done that, but not so much as the Germans. At the last Paris Exposition there was at least one Danish exhibitor, a Dutch exhibitor and quite a number of English exhibitors, who had the assurance to bring to that Exposition stoves pirated from American production. In general I may say that the German stove is not better described than by the statement that it is similar to the American type. In Switzerland they produce no gas stoves; they import them all. The same may be said of Holland, which is perhaps the best customer we have in Europe for American gas ranges and other heating and cooking appliances. The same might be said, possibly, of Belgium. They are not only copying our gas ranges, but they are purchasing our so-called gas radiators for heating purposes. There are thousands exported every year.

Mr. Lowe—Do they use the American or the English type of stove in Canada!

Mr. Kahn—Altogether the American stove.

Mr. Jones—It seems that one point of utility in the English stove has been overlooked. I should like to ask if it is not possible to use the English stove for cooking during the day and also as a fireproof safe in which to keep valuables during the night? (Laughter.)

Mr. Hollidge—I believe in discussing the question of these stoves in a spirit of fairness, and it seems to me the gentlemen have not struck the point which I think they should have under consideration. First, if I understand the methods of cooking in our country and in England, they are two very different systems. The system of cooking in the United States is a great deal on the baking plan, as suggested by Mr. Kahn, while in Great Britain a great deal of the cooking is done by boiling and steaming and what they term "roasting," and what we term "roasting" is what they term "baking." They monopolize the whole oven with a small joint. It is so different from our cooking. In the center of the English oven is a ring bolt and a hook; attached to that is a little spring that is purchased for a mere song, and the meat is hooked to this spring and continually revolves in the oven until the spring runs entirely down. These springs run for about 2 hours, and by that time they generally figure that the joint is cooked through. There is a good deal of basting, with a dish underneath, which occupies a good deal of time and as a natural consequence takes more gas. Bear in mind, too, that if you take a gas cooking stove with regulated shutters for the Bunsen burners and a gas stove that has no regulation at all and light the two, the one properly adjusted will give off the most heat and burn the least gas, and the one that is not adjusted and has no shutter will burn more gas and give less heat from the fact of drawing in more cold air and thereby depreciating the flame; and it will not give a satisfactory flame for cooking, either on top or in the ovens. Another thing to be considered is the weight of the stoves. The English stove which Mr. Aldrich has so kindly brought here weighs, I believe, 300 pounds, whereas an American stove can be placed by one man. Of course, the difference in the cost of the stoves is also very great; one is $25 and the other about half that. And if a man can get a good stove delivered for $12, he is certainly not going to pay $24. I could enumerate several other points in which I think, in a spirit of fairness and justice, the English stove does not come up to the American in any way, shape or form. I must say that the white enamel is a good departure and that the English stove seems to me neat and attractive. On the other hand, as Mr. Kahn said, the white enamel decreases the heat inside the oven and will not give you as satisfactory a cooking heat. It will reduce the heat, thereby using more gas. I think if you will look at both types of stove the question will be settled without either judge or jury, in the spirit of what I term honest fairness.

Mr. Roper—I think Mr. Kahn and the gentleman who spoke last are a little off. I have been making tests with enamel. It reflects the heat and will not absorb it as much as the ordinary steel range we now have. The consequence is the enameled oven does not take up and waste the heat; it really saves it. You would be working with reflectors, to a large extent, that you don't get in the ordinary make of stove. While I am not positive, and would not make the statement emphatically, I am of the opinion that it really would be the most economical thing we could do in the American stove to enamel it, provided the enamel will stand on the sheet steel. I would like to say another thing. I was led by one of our first-class engineers into making a lot of tests, and this so-called true combustion and getting so many heat units and so on by the adjustment of a valve is very largely theory. If you adjust those stoves or burners so that there is not perfect combustion, and will produce a little marsh gas and burn it up, you can get better results than by adjusting the same burner so that there is so-called perfect combustion.

Mr. Kahn—One word. I think the last speaker and possibly some other gentlemen misunderstood what I said. I did not say the enamel itself would cause slower baking. I did say it would require much heavier plates to put the enamel on and that, therefore, it would re-

quire longer to do the work than would be the case if the plates were lighter, the slow baking being due not so much to the enamel as to the heavier plate.

Mr. Lowe—I raised the question of the enameling of the ovens not because I was seeking information on it, but to get the opinions of the stove manufacturers. I am of the opinion that the enamel is a poor thing from the point of view of economy. If you were firing a steam boiler and had enameled sheets you would not get much heat into the water, and if you are depending upon the heat that comes from the sheets into the oven, and enamel the oven it is exactly like insulating. I think it is a very poor thing, though it certainly is nice from the point of view of cleanliness. I am satisfied that a thin sheet of enamel will use a great deal more gas to do the same work.

Mr. Jones—But, Mr. Lowe, you must stop to think in the case of the steam boiler your heat would have to penetrate from the outside through the enamel, while in the case of the stove lining the white enamel merely reflects the heat inside.

Mr. Lowe—That is, if you are passing the products of combustion through the oven.

Mr. Kahn—Which is the case in the gas range.

Mr. Lowe—And erroneously so. I am speaking of cases where the heat surrounds the oven, and I am satisfied that is the only proper way.

Mr. Roper—The so-called gas range we are now making has seen its last days. The coming stove will have a single oven and a broiler and will be more substantial.

Mr. Lowe—Do you not think that it will be built somewhat on the line of the successful coal stove?

Mr. Roper—I did not know there was a successful coal stove. (Great and prolonged applause.)

On motion, a hearty vote of thanks was extended to Messrs. Main, Barber and Keyes for their interesting and instructive papers.

[To be Continued.]

[Concluded from Page 412.]

Location of Electric Stations.

By Mr. Alton D. Adams, in *Elec. Engineer.*

Besides the general movement of electric stations away from business centers to cheap land along railways or on river or harbor fronts in order to keep down investments in real estate and to reduce expenses for fuel and water, there is another important reason for changes in the locations of generating plants. This is the substitution of water power for steam. In order to make this substitution it is, of course, necessary to take the generating plant to the water power site and to rely on electrical transmission to deliver the energy at the distribution area. Some distinction may here be taken between great transmission systems that exist independently of any of the cities that they serve and those smaller developments of water power that are primarily designed to replace existing steam plants in particular cities. In this latter class may be mentioned the water power plant about 3 miles from the center of Burlington, Vt., that has entirely displaced the former steam-driven station in that city. Another similar example may be seen at Manchester, N. H., where the steam station adjacent to both railway and river has been in the main displaced by 4 water power plants ranged about the city and from 3 to 14 miles distant. At Concord, in the same State, a like fate overtook the steam power plant some years ago and the load of the electric system was transferred to a water-driven station several miles above on the Merrimac river. In Springfield, Mass., most of the load of the electrical supply system is no longer carried by the steam station on the water front, but instead by 2 water power plants that are 5 to 6 miles distant.

Generating stations in the business centers of cities have often disappeared as such only to reappear at once as sub-stations. This is true both as to plants that have been displaced by better located steam stations and as to those that have transferred their loads to water power. Almost every objection that can be urged against the location of a generating plant in a business section of a city fails when applied to an electric sub-station. Even in the matter of land values the sub-station requires but a small investment in comparison with the steam plant, because of the far greater capacity per unit of ground area and space in the former. Not infrequently the formerly main generating plant of a system after its conversion into a sub-station does duty as an auxiliary steam plant to carry the peak of the load or even more when water power is low.

In Hartford the Pearl street plant, which at one time developed most of the energy used in the electric system by steam power, now serves as a sub-station to receive the transmitted outputs of two water powers that supply most of the current distributed in that city. Besides its work as a sub-station, the Pearl street plant develops whatever energy the system requires from steam power.

The well located steam station in Springfield, Mass., is now used mainly as a distributing center for the transmitted current that comes in from the two water powers of the system, but its engines are operated when occasion requires. A similar condltion exists at the steam plant of the Manchester (N. H.) system, which operates alternately as a generating and a receiving station, according to the amount of available water power at the four other stations that connect with it by transmission lines. Where a more or less distant water power takes up the work of a steam-driven station, the steam plant is seldom moved to the site of the water power, though this is done in a few instances. A case in point is that at Burlington, Vt., where the water power station, distant about 3 miles from the business center, contains also the steam plant of the system.

Even where an existing steam-driven station is not so centrally located as to make it a very desirable distributing point for transmitted water power, there is a strong tendency to use it for this purpose when such water power is adopted. Much justification for this practice is found in the fact that all distribution lines usually radiate from such stations. Both Albany and Troy, N. Y., illustrate this practice, for in each of these cities a steam-driven electric station that is far from central now serves as the distributing point for energy transmitted from Spier Falls on the Hudson river.

Water power plants that are quite near to the cities they supply with electric current usually have their energy distributed through sub-stations. Thus at Concord the water power is only 3 miles up stream from the sub-station that distributes current in the city. At Lewiston, Me., the new water power plant is 3 miles by the line from the old plant that serves as a sub-station in that city. Bangor, in the same State, draws its electric energy from a water power about 4 miles from the sub-station that distributes it to consumers. In some cases a steam power station has been so far removed from the business center of the city which it is mainly intended to supply that distribution through one or more sub-stations there was necessary, but this is not the general rule.

There is a growing number of instances, however, where the steam driven electric station near a rather large city delivers current for distribution through more or less distant sub-stations in surrounding towns. This practice may be noted at Lowell and North Adams, Mass., Providence, R. I., Hartford and New Haven, Conn., and particularly about Boston, whence lines to suburban towns run out some 25 miles. With the highly concentrated loads of great cities the removal of generating plants to points where transportation of fuel is easy, land cheap and condensing water free, is apt to make sub-stations in the business districts very desirable. Boston illustrates in a rather striking way the importance of sub-stations in 3-wire, 250-volt distribution, for in that part of the city between Massachusetts avenue and the harbor there are 6 sub-stations. This section is about 2.25 miles long, a little more than 1 mile wide and includes the most densely populated residential portions as well as the main business area of the city. Included in this enumeration of sub-stations are the plants at Head place, Hawkins street and Atlantic avenue, all three of which were first designed to operate with steam power.

The plants at Head place and Hawkins street long since ceased to develop electrical energy from steam, and now serve merely for distribution purposes. Though the L street station in South Boston now develops the greater part of the current used in the system, the Atlantic avenue plant still does a large amount of generator work, and also operates as a sub-station receiving current from L street. Before the purchase of the Boston electric light system by the Edison Company, the Atlantic avenue station of the latter was doing nearly all of the generator work of its system and sending its current to Head place and Hawkins street, Scotia and Canton streets for distribution.

Looking backward at the locations of early lighting stations, it is now easy to see that the importance of small line losses was much exaggerated. The majority of the pioneer plants began business with arc dynamos, whose full load pressures ranged from 1,000 to 3,000 volts, or with alternators of about 1,000 volts, and yet these plants were usually crowded into the center of business districts, as were those of lower pressure. Even with the 500-volt dynamos that were introduced a little later for power service the current might easily have been distributed directly to motors from stations favorably located as to coal, water and land values.

As to the early Edison systems, at 250 volts, it is evident that the sub-station idea was as applicable in 1883 as it is now, if its utility had then been appreciated. The first Edison station in Boston might, with advantage, have been on Atlantic avenue instead of at Head place, and might have transmitted its current to sub-stations for regulation and distribution just as is done now.

These suggestions carry no reproach to the engineers of these early plants, for they were leaders in their day, and on their work the foundations of electrical supply were laid.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The Gas Appliance Company of America has closed its store at Troy, N. Y., and Mr. W. L. Willis, who was formerly connected therewith, informs us that he is now with the gas appliance department of the H. Calhoun Company, Troy, N. Y.

Mr. J. H. Enright is now in charge of the plants of the Frederick (Md.) Gas and Electric Company. He has been authorized to virtually reconstruct its electric lighting plant, and it may be taken for granted that he will not in any sense neglect the money-making end of the enterprise.

AT the annual meeting of the Concord (N. H.) Gas Light Company the following officers were elected: Directors, L. D. Stevens, John Kimball, Henry McFarland, F. A. Stillings, H. C. White, John M. Mitchell and John P. George; President, L. D. Stevens; Secretary, John C. Ordway; Treasurer, John Kimball.

WRITE to the C. W. Hunt Company, West New Brighton, N. Y., for a copy of its catalogue numbered 047.

ADVICES from Barre, Vt., are to the effect that the promoters of the gas company there are well pleased over the results of the canvass for consumers.

ADVICES by way of Philadelphia are to the effect that 90 per cent. of the shareholders in the Westchester (N. Y.) Lighting Company have agreed to the refinancing terms under which the properties are to be transferred to the purchasers, the latter being people quite conversant with the affairs of the Consolidated Gas Company, of New York.

AN issue of $1,500,000 bonds, bearing 5 per cent. interest, and to run for 50 years, has been authorized by the shareholders of the United Gas and Electric Company, of New Albany, Ind. One-half of the issue will go to the redeeming of existing bonds and the income from the balance will be devoted to plant betterments.

ADVICES by way of Toronto, Can., are to this effect: "The Consumers Gas Company, of this city, has given the authorities formal notice of its intention to offer for sale on December 6th 5,000 shares of new stock. The action of the Company will render it necessary to hold a special election to vote on the question of the purchase of gas stock by the city. The act requires that 3 months' notice be given to the city, and it was felt that the expression of the feeling of property owners might be taken on the same day as the municipal election. If the city acquires $10,000 worth of stock, the Mayor becomes a member of the Board of Directors. The Mayor, however, has expressed his opinion that the various money by-laws should be submitted by themselves, and the gas question will be decided at the same time."

THE Citizens Heat, Light and Power Company, of Elwood, Ind., has notified the residents that, from October 1st, the gas rate is to rule at 30 cents per 1,000 cubic feet. It is a natural gas concern.

THE North Alabama Gas Company, which controls the gas supply of Florence, Ala., has been granted the right to furnish gas to the residents of Tuscumbia, Ala.

IN the reorganization of the Norwich (N. Y) Gas and Electric Company the following Directors were chosen: Henry Sprague, Walter Callender and Chas. S. Tanner, of Providence, R. I.; and Lawrence Barnum, of New York city.

"T. L. S.," writing from Chicago under date of the 10th inst., says the earnings of the Peoples Gas Light and Coke Company of that city were the largest of any summer month in its history. The low average temperature of the month under consideration is beyond doubt largely responsible for the abnormal increase.

SUPERINTENDENT KRAMER, of the Peoples Gas Company, of Pottstown, Pa., says that the betterments on the plant will be completed by December 1st. An important item in the additions is a storage holder up to retaining 750,000 cubic feet.

THE Champaign (Ills.) Gas and Electric Supply Company is now comfortably housed in handsomely fitted offices in the Harris Building, North Nell street.

AT a meeting of the Park Board, of Baltimore, Md., held some time ago. the recommendation of General Superintendent Crosby, that the lighting of the city squares be hereafter performed by gas instead of electricity, was considered. The Superintendent contended that the arc lights are at too great an altitude to give good illumination where the latter was needed; further, that gas lamps of the improved Welsbach type, from experience gained therewith in other cities, would certainly be acceptable. It was decided, as the outcome of the discussion, to experiment with gas lamps in one square, and if the results were satisfactory the change would be made general. It might be added that Superintendent Crosby presented figures showing that lighting by gas would be cheaper by 25 per cent. than under the present electric lighting system.

THERE is little doubt that the artificial gas plant to be constructed by the Muncie (Ind.) Gas Light and Fuel Company, will be located on the site of the old water works plant on White river and south of the tracks of the Big Four Railroad.

THE proprietors of the Lima (O.) Natural Gas and Light Company, it is said, have determined to construct a works for the producing of artificial gas.

THE Garnett (Kas.) Gas Company has been incorporated with a capilal of $100,000.

FONDA, Ia., has voted to R. H. Healan a franchise for the right to operate a gas works there.

AT a special meeting of the shareholders in the Spartansburg (S. C.) Gas Light and Power Company it was decided to issue bonds not to exceed $400,000, the same to bear interest at the rate of 5 per cent. It is understood that the bonds will be issued at intervals, and the proceeds are to go mainly to betterment account.

MR. W. C. ANDERSON has been appointed General Manager of The Gas and Electric Company, of Bergen County, N. J.

MR. A. E. DUNN and associates have applied to the authorities of Greenville, Ills., for the right to operate a gas works.

MR. GEORGE FULLERTON, formerly Superintendent of the old Mutual Gas Company, of Buffalo, N. Y., died in Buffalo, the morning of the 4th inst.

ADVICES by way of Rutland, Vt., under date of the 10th inst., are to this effect: "A hearing was held in Montpelier, Vt., the 5th inst., before Interstate Commerce Commissioner S. A. Pronty, in the case of the Capital Gas Company, of Montpelier, vs. the Central Vermont Railway and the Rutland Railroad Companies. The point at issue is whether railroads have a right to discriminate in freight rates between individuals and corporations. The case grows out of a freight rate on coal between Montpelier and Norwood, N. Y., the charge being made that the Montpelier & Wells River Railroad Company was charged 87 cents a ton, while the Capital Gas Company was compelled to pay $1.85 a ton. Testimony showed that the Gas Company was using about 100 tons of coal each month. Mr. Pronty said the case hinged on a point of law, whether it was lawful to charge a railroad company a lower rate than that granted for commercial purposes. He gave the plaintiff 30 days in which to file a brief and the defendant 20 days for the same purpose."

MR. E. J. CURLEY, Superintendent of the Wilmington (Del.) Gas and Electric Company, has completed arrangements for the laying of mains and services in the outlying district of South Wilmington.

THE Delray (Mich.) Gas Light and Coke Company has secured control of the Wyandotte Gas Company.

THE English correspondent of *Electricity*, commenting on the falling-off in the electrical trade in England, says: "Every week brings additional evidence to prove the present very unsatisfactory condition of British electrical manufacturing. A few years ago, when municipal lighting and tramway development was at its best, British manufacturers were being urged on every hand to make wide extensions of their works so as be better able to meet the needs of the country with greater expedition and with more economical production costs, rendering it easier for the Britisher to compete with the Continental dumper, who was depositing surplus manufactures at less than cost price. The extensions were made—in some cases with reluctance—and to-day there are undoubtedly quite sufficient modernized electrical manufactories established in the United Kingdom to cope with a fairly large demand for machinery and apparatus required in every department of electrical work. But, unfortunately, owing among a number of causes to the course which municipalization agitations have taken and the difficulty experienced in getting money from the investing public, there is a serious lack of orders. It follows as a natural corollary of this condition of trade that these extended and other electrical manufactories find it a matter of the utmost difficulty to obtain sufficient contracts to enable them to keep their works in operation and to make a profit on their turnover. Some of them had to go so far as to drop all hopes of earning profits for a time if they can only manage to get the work to do so that the men may be kept employed."

THE AMERICAN GAS LIGHT JOURNAL

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, SEPTEMBER 19, 1904.

The Market for Gas Securities.

Very peculiar conditions existed in the market for city gas shares last week. The trading in Consolidated was on a larger scale than for months back and the bulk of it was done at figures that averaged close to 206. The high point was well above 207, and the closing today (Friday) was 205¾ to 206. Rumors respecting the shares were many, and the old thought that the dividend rate was to be increased was again trotted out. There is very little likelihood of such happening, and we take it that the main reason for the marked gain was an important purchase for permanent investment account. Other city shares were dull, although a bid of 300 for Mutual failed to bring out any stock.

Brooklyn Union sold at 223, and at the close 220 was bid, holders asking 224. The increase in Cincinnati Gas and Electric was more than held, the shares having sold Wednesday last at 106¾ ex-dividend.

There is no change in Baltimore gas values, and Washington (D. C.) gas is also neglected, prices for it, however, being well maintained.

The U.G.I. Company has declared its regular quarterly dividend of 2 per cent. Gas bonds, of any accredited issue, readily find purchasers.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 19.

☞All communications will receive particular attention.

☞The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	205¾	206
Central Union, Bonds, 5's	3,000,000	1,000	106½	108½
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan	658,000	..	108	112
Mutual	3,500,000	100	270	300
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	107½	109
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	..
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	..
Northern Union, Bonds, 5's	1,250,000	1,000	102½	103½
New York and East River.. Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000	..	106	108
Standard	5,000,000	100	125	130
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	220	224
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	—	—
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works...	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	4	4¼
" " Bonds, 5's	5,250,000	1,000	12¾	.
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	20,500,000	100	106¾	107x
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89¼
Preferred	3,026,500	100	107½	109
Consumers, Toronto	2,030,000	50	200	204
Consolidated, Baltimore....	11,000,000	100	..	81½
Mortgage, 6's	3,500,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	86	90
Consolidated G. & E. Co.'s. Little Falls, N.Y.	99,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	951,000	1,000	75	75¼
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	25	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	78	80
" Bonds, 5's	10,500,000	..	105¼	106
Indianapolis	2,000,000	..	66	70
" Bonds, 6's	2,650,000	..	103½	106½
Jackson Gas Co	250,000	50	82	.
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	..
Preferred	2,500,000	100	80	100
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	108¼
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	64	70
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	102¾	103
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	.
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15,800,000	100	58½	58¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	94	96
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's..	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	46	48
Bonds	2,047,000	1,000	94	96
Washington, D. C	2,600,000	20	287½	288¾
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	200	..

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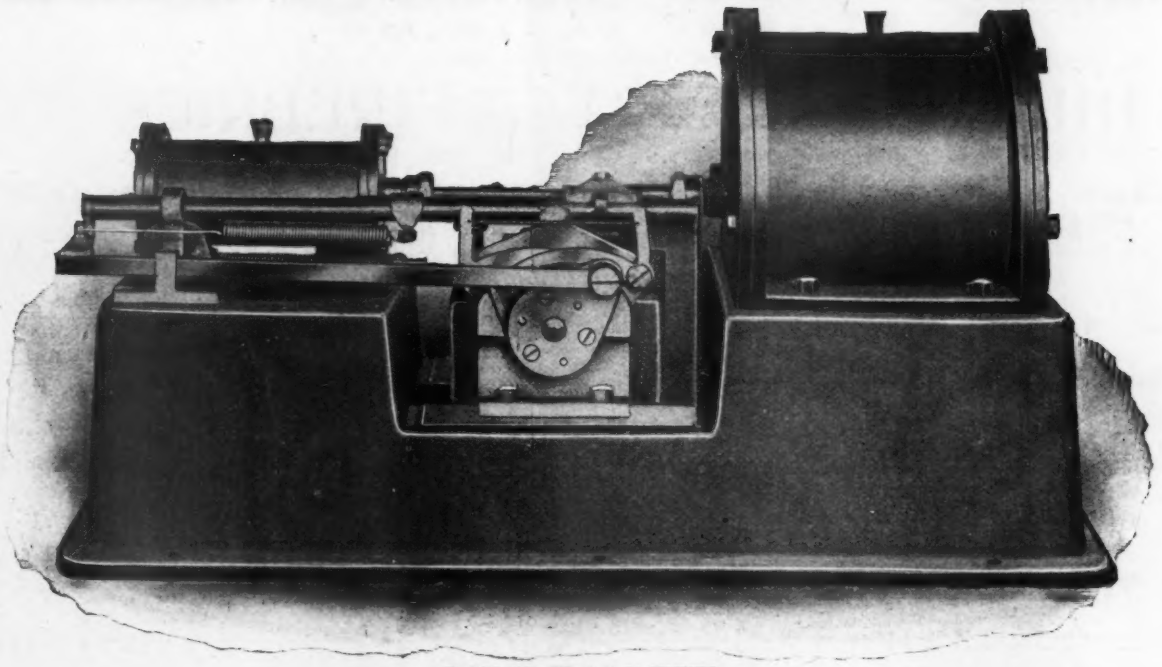

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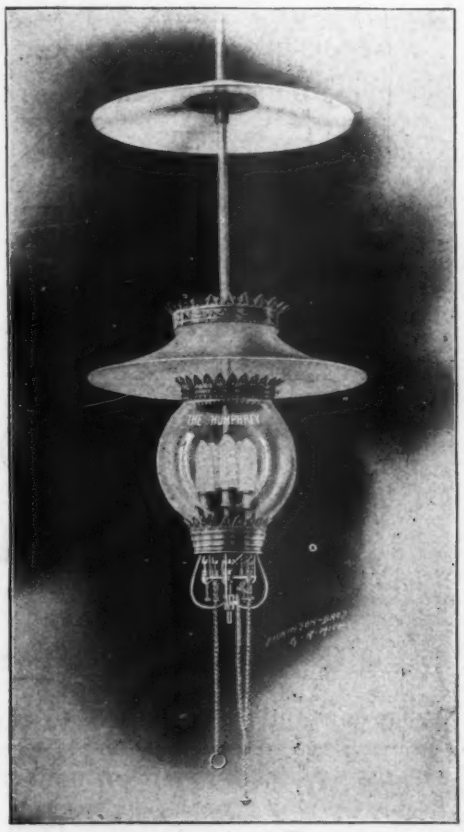

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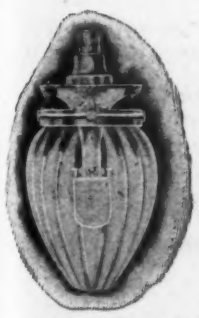

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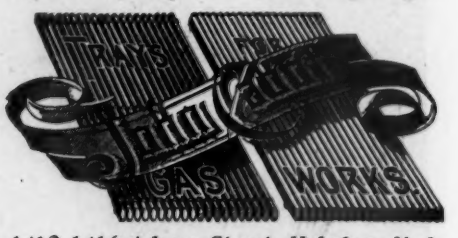

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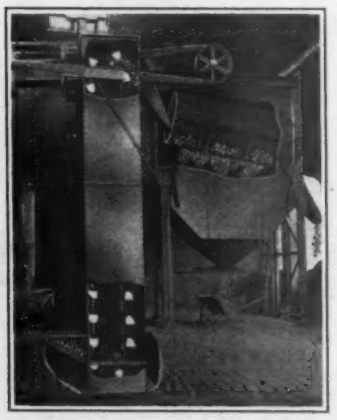

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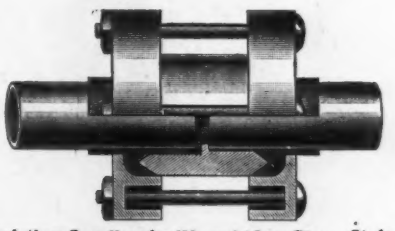

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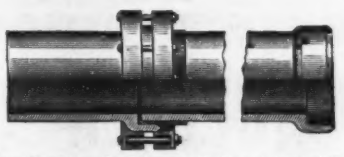

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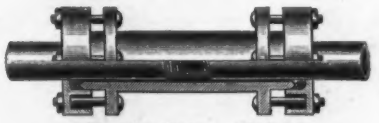
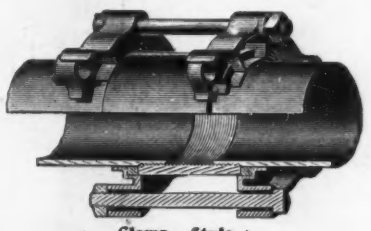
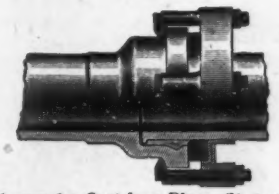


Regular Sleeve. Style 2.



Clamp. Style 4.



Clamps for Cast Iron Pipe. Style 4½.

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

My Insulating Coupling prevents the destruction of pipe by electrolytic action, in either water or gas lines.

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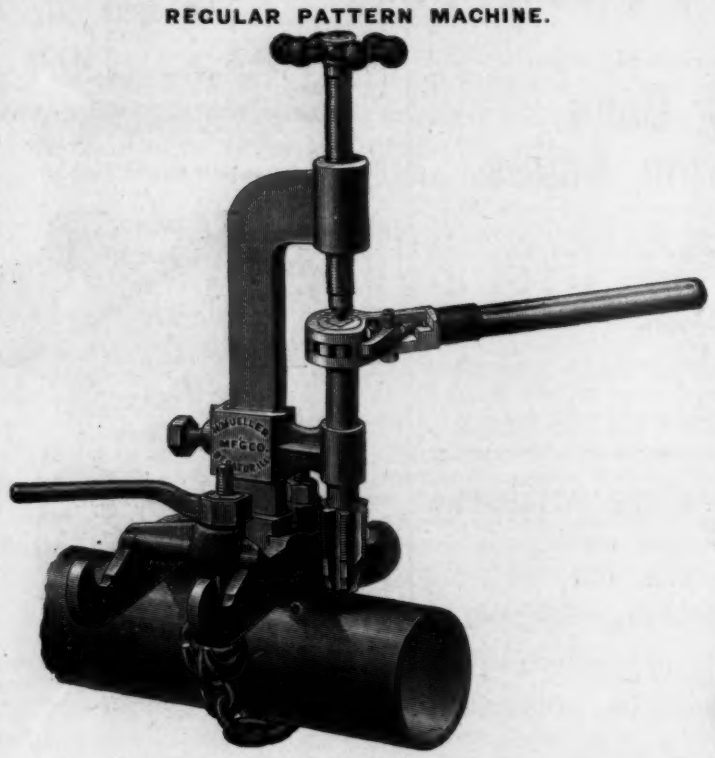
LLOYD CONSTRUCTION COMPANY,
DETROIT, MICH.

GAS WORKS BUILDERS.

MUELLER GAS MAIN TAPPING MACHINES.

REGULAR PATTERN MACHINE.



C—1000.

Light open tapping can be done with a machine, especially designed for the purpose, more economically than with one designed for heavy work.

The Mueller Regular Tapping Machine is especially designed for light open tapping. It does its work as well and lasts as long for its purpose as a heavy machine, and costs much less.

Mueller Gas Main Tapping Machines are made in seven different styles for different classes of work, and make taps from ¾ to 3-inch in any size of pipe.

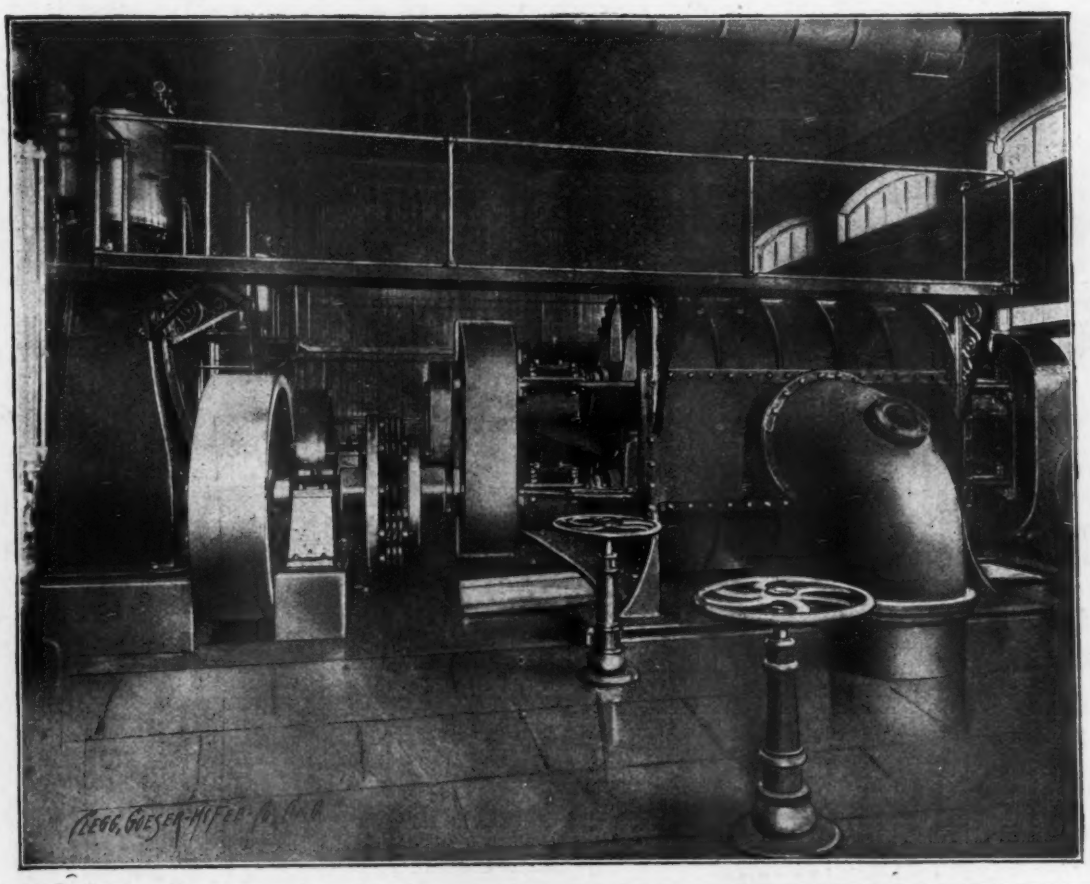
Each machine is given a working test as near like actual service use as possible, bears the Mueller trade mark, and is *unconditionally guaranteed.*

We also make a full line of gas cocks and meter connections for gas works' use. Catalogues upon application.

Mueller Tapping Machines are on exhibit in the Palace of Manufactures, World's Fair.

H. MUELLER MFG. CO.,
DECATUR, ILL., U. S. A.

ROOTS' GAS EXHAUSTERS.



Installation showing our latest improved machines, with flexible rope coupling, for large units.

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HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
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THE SUMMER SEASON

Means More Hot Baths.

Furnish your consumers the easiest, quickest, cleanest and most economical means of securing Hot Baths by recommending or selling the

Humphrey Crescent Instantaneous Water Heaters.

Price, $16 to $45, GUARANTEED.

The No. 6, price $25, here illustrated, will heat three gallons of water per minute 50° in temperature, supplying a large family at any time with all the Hot Baths wanted.

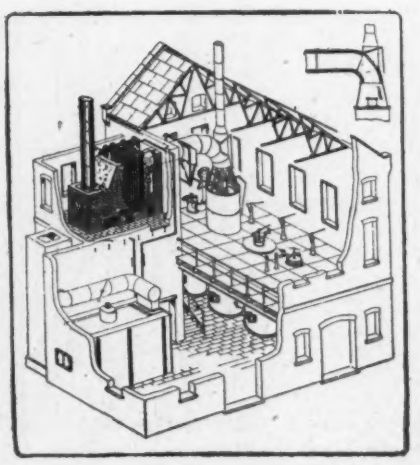
We Make Quick Shipments.

Send to-day for prices to **HUMPHREY CO., Kalamazoo, Mich.**

Economize Heat in Water Gas Plants,

BY UTILIZING A

Green's Economizer,



To absorb the heat now going to waste when you blow through your superheater to heat the feed water for your boilers to the temperature of the steam. This is now being done at the Poughkeepsie Gas Works, Poughkeepsie, N. Y.

Write for full particulars how this is accomplished, the saving effected, and the advantages gained, to the

GREEN FUEL ECONOMIZER CO.,
MATTEAWAN, N. Y.

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CAST IRON FLANGE GAS and WATER PIPE

GENERAL SALES OFFICE:

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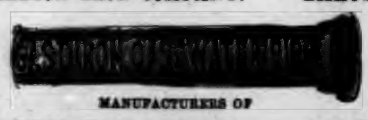
JOHN DONALDSON, Prest. Betz Bldg., Phila., Pa.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.



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CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

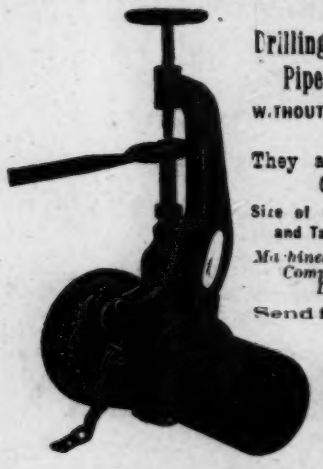
WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.



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THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

Consulting Engineers.

Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::

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Established 1856. Works at Phillipsburgh, N. J.

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CAST IRON WATER AND GAS PIPE,

FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

NO LEAKY JOINTS IN **UNIVERSAL PIPE.**

Specially adaptable for—

High and Low Pressure Gas Mains.
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CAST IRON PIPE and SPECIALS FOR WATER AND GAS.

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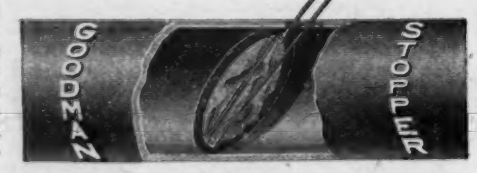
SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains

Temporarily during alterations and repairs. : : : :

Any size gas main can be shut off in 30 seconds. : : :



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FOR GAS WORKS.

STATIONARY, SHAKING, DUMPING.

BARS FOR HAZELTON BOILERS.

LINK-BELT

OPEN TOP CARRIER.

ESPECIALLY ADAPTED FOR HANDLING

Coal, Coke, Ashes, Stone, Ores,

Or any heavy or gritty materials, where strength and durability are essential. Constructed in any length or capacity, and to suit local conditions.

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Link-Belt Engineering Co. Philadelphia Chicago, U.S.A.

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AMERICAN METER CO.

ESTABLISHED 1836. INCORPORATED 1868.

NEW YORK,
PHILADELPHIA,
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ST LOUIS,
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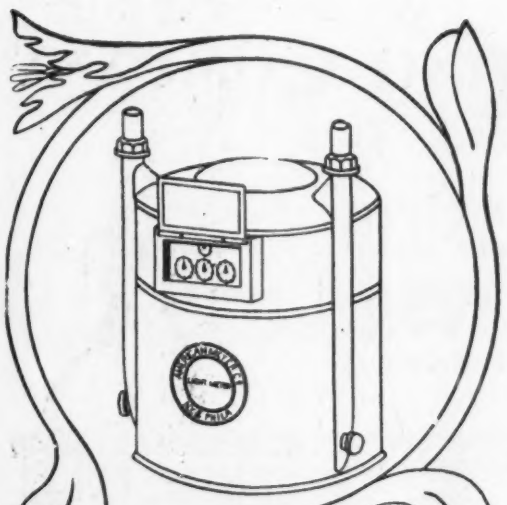
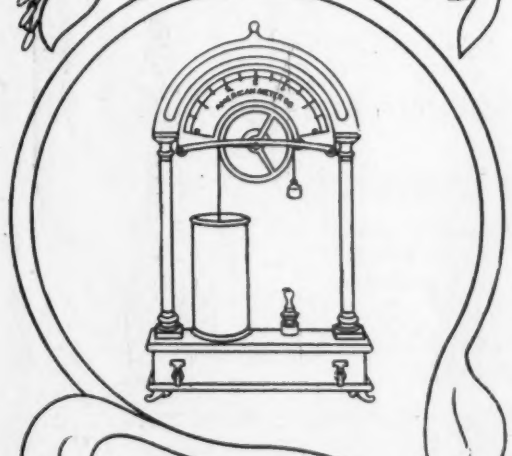
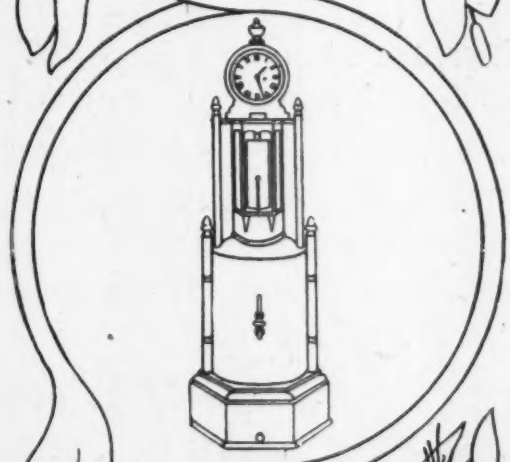






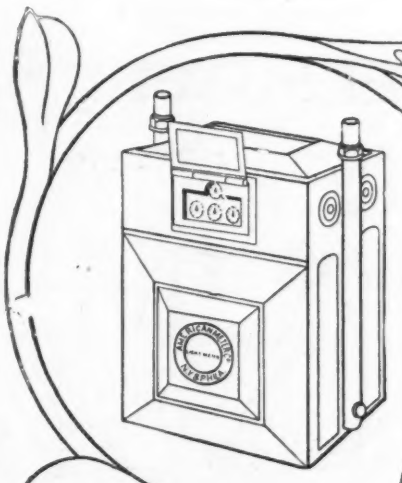
PUBLIC LIGHTING TABLE.

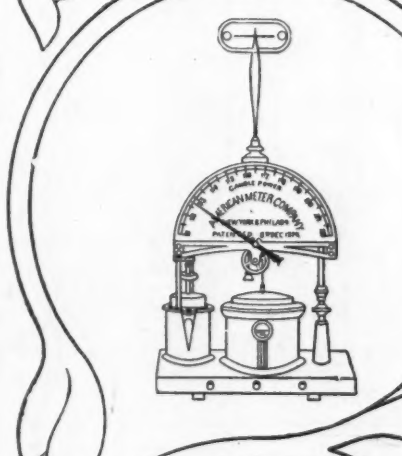
OCTOBER, 1904.

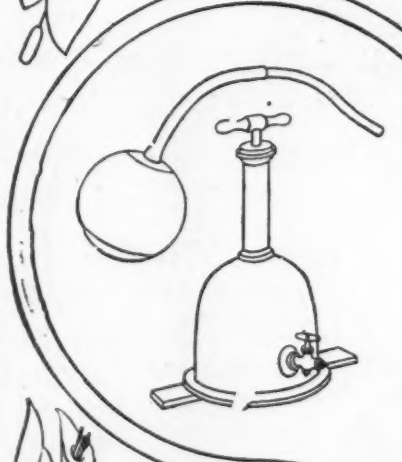
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Sat.	1	6.20 PM	11.30 PM	5.30	5.00
Sun.	2	6.10 LQ	12.20 AM	5.30	5.00
Mon.	3	6.10	1.30	5.30	5.00
Tue.	4	6.10	2.30	5.30	5.00
Wed.	5	6.10	5.00	5.30	5.00
Thu.	6	6.10	5.00	5.30	5.00
Fri.	7	6.10	5.00	5.30	5.00
Sat.	8	6.10 NM	5.00	5.20	5.10
Sun.	9	6.00	5.10	5.20	5.10
Mon.	10	6.00	5.10	5.20	5.10
Tue.	11	6.00	5.10	5.20	5.10
Wed.	12	6.00	5.10	5.20	5.10
Thu.	13	8.00	5.10	5.20	5.10
Fri	14	9.00	5.10	5.20	5.10
Sat.	15	9.50 FQ	5.10	5.10	5.20
Sun	16	10.50	5.10	5.10	5.20
Mon.	17	11.40	5.10	5.10	5.20
Tue.	18	12.40 AM	5.10	5.10	5.20
Wed.	19	1.30	5.10	5.10	5.20
Thu.	20	2.30	5.10	5.10	5.20
Fri.	21	3.20	5.10	5.10	5.20
Sat.	22	No L.	No L.	5.00	5.30
Sun.	23	No L. FM	No L.	5.00	5.30
Mon.	24	No L.	No L.	5.00	5.30
Tue.	25	5.40 PM	7.10 PM	5.00	5.30
Wed.	26	5.40	7.50	5.00	5.30
Thu.	27	5.40	8.30	5.00	5.30
Fri.	28	5.40	9.20	5.00	5.30
Sat.	29	5.40	10.20	4.45	5.35
Sun.	30	5.30	11.10	4.45	5.35
Mon.	31	5.30 LQ	12.20 AM	4.45	5.35

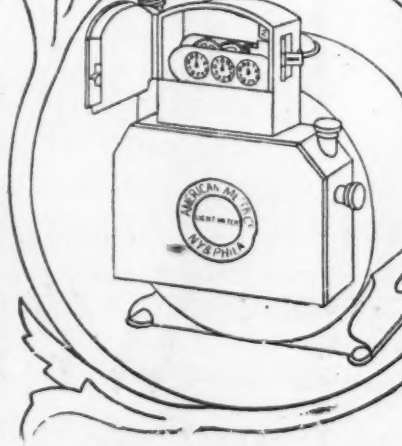
TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00





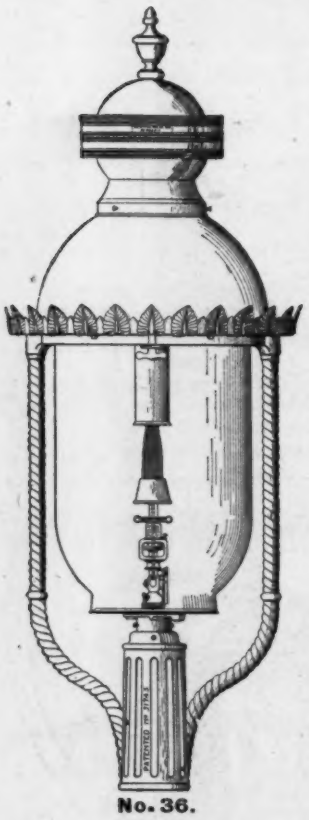




NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple-

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

WELSBACH CO.,

Broad and Arch Sts., PHILADELPHIA.

THE UNITED GAS IMPROVEMENT COMPANY

For the Period Ending July 31st, 1904, has been Awarded Contracts in the Following Places for

Standard Double-Superheater Lowe Water Gas Apparatus.

Augusta, Me.
Bangor, Pa.
Woonsocket, R. I. (2d contract).
Brooklyn, N. Y. (4th contract).
Cincinnati, O. (2d contract).
Scranton, Pa. (3d contract).
New York City (14th contract).
New Haven Conn. (2d contract).
Watertown, N. Y.
Tampa, Fla.
Westchester, N. Y. (3d contract).
Bridgeport, Conn. (2d contract).
St. Paul, Minn. (2d contract).
Harrisburg, Pa.
Pelham, N. Y.
Reading, Pa.
Springfield, Mass.
Lynn, Mass.

TOTAL SETS, 1904, ... 35
TOTAL DAILY CAPACITY, 1904, . . 50,400,000 cubic feet.
TOTAL SETS TO DATE, ...543
TOTAL DAILY CAPACITY, . . . 413,180,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
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MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
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MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

Established 1854. Incorporated 1869.

LACLEDE
Fire Brick Manufg. Co.,

Manufacturers of { GAS RETORTS . .
FIRE BRICK . . .
RETORT SETTINGS

Water Gas Cupola Linings, Fire Clay, Etc.

Proprietors for the U. S., Coze System of Inclined Benches.

Estimates Furnished on Application for Most Successful Style of Construction.

Also for Free-Firing and Full and Half-Depth Regenerative Benches, for Burning either Coal or Coke in the Furnaces.

Office:
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Established 1845. Reorganized 1902.

The Kreischer Brick Mfg. Co.,

Manufacturers of the very best quality of Clay Retorts, Blocks, Tiles, Settings and Firebrick of every description.

Also Miners and Shippers of Fireclay, Fire Sand, Ground Brick in Barrels.

WORKS: KREISCHERVILLE, STATEN ISLAND.
OFFICE: 119 E. 23D STREET, NEW YORK CITY.

Adam Weber Sons.

GENERAL OFFICES: Park Row Bldg., N. Y. City.
DEPOT & WAREHOUSES: 639 E. 15th St., N. Y. City.
WORKS: Weber, N. J.

ERECTION OF

Modern Coal Gas Plants,

With either Horizontal, Inclined or Vertical Retorts.

PATENTS APPLIED FOR.

No. 1. Firing horizontal benches with pulverized fuel, with either 8 or 10 retorts in 1 setting, using one furnace for two benches. Great saving in labor, fuel and life of retorts and settings. No elaboration of complex recuperation.

No. 2. Independent retort settings, taking all weight from retorts.

No. 3. Vertical retorts with vertical charge and discharge. Sixteen retorts in one bench.

MODERN BENCH IRONWORK.

ISAAC C. BAXTER, President. ESTABLISHED 1864. PETER YOUNG, Sec'y and Treas.

Works.
LOCKPORT STATION, PA.

JAMES GARDNER, JR., CO.,

Address all communications to
JAMES GARDNER, JR., CO., Room 202 Lewis B'l'dg.
PITTSBURGH, PA.

Successor to WILLIAM GARDNER & SON.

Fire Clay Goods for Gas Works.

HENRY MAURER & SON,

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

RETORT WORKS

WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y.

Clay Gas Retorts,
BENCH SETTINGS,
Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. BLOOMINGTON, INDIANA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD, BLOOMINGTON, IND.

For orders East of Buffalo, N. Y., or Pittsburg, Pa., freight will be paid to these points.

Bristol's Recording
PRESSURE GAUGE.

For continuous records of Street Gas Pressure. Simple in construction, accurate in operation and low in price.

Fully Guaranteed. Send for Circulars.

THE BRISTOL CO.,
Waterbury, Conn.

Silver Medal, Paris Exposition.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.

Plans prepared and Estimates furnished at short notice.

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BALTIMORE
RETORT & FIRE BRICK CO.

MANUFACTORY AT
LOCUST POINT, BALTIMORE, MD.

Clay Retorts, Blocks & Tiles

FIRE BRICK, FIRE CLAY, AND FIRE CEMENT.

Our Improved Half and Full Depth Benches have been Adopted by Many Gas Companies.

WALDO BROS., 102 MILK ST., BOSTON, MASS.

Sole Agents for New England States.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

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Continental Bank,
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Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

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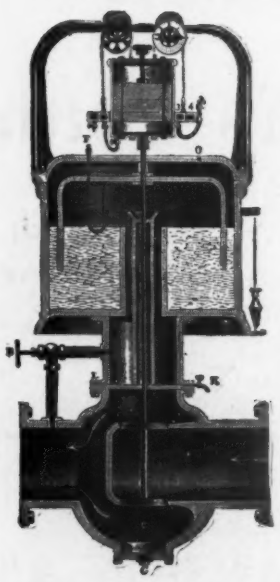

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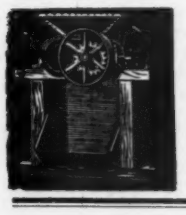

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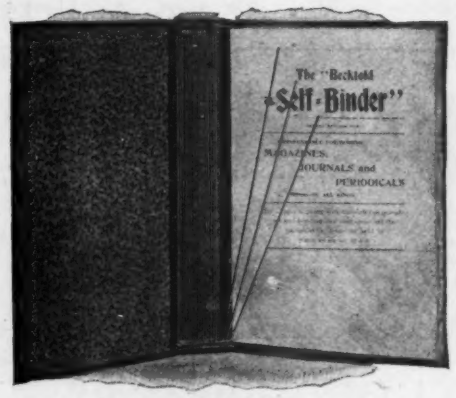

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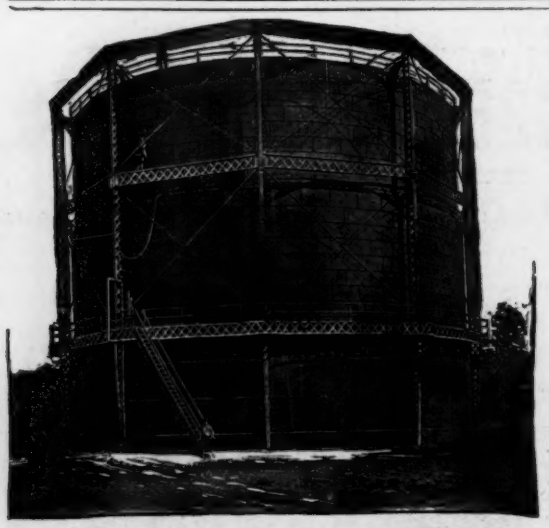

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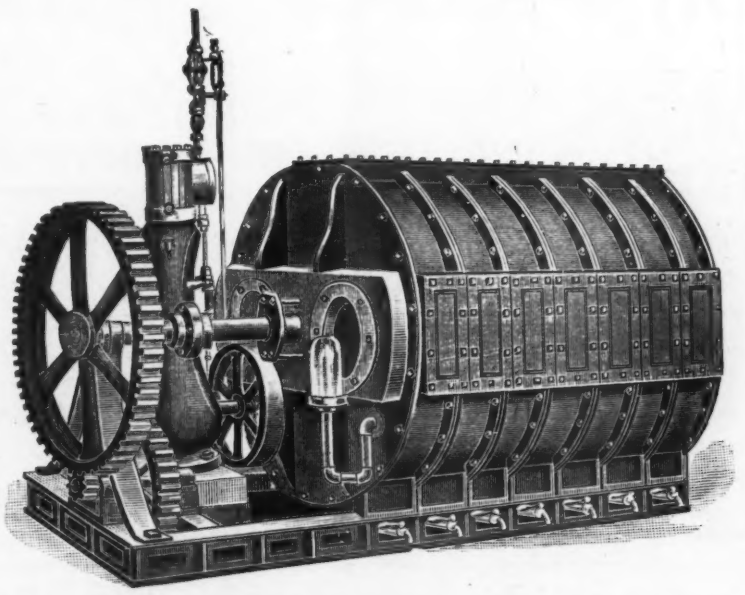

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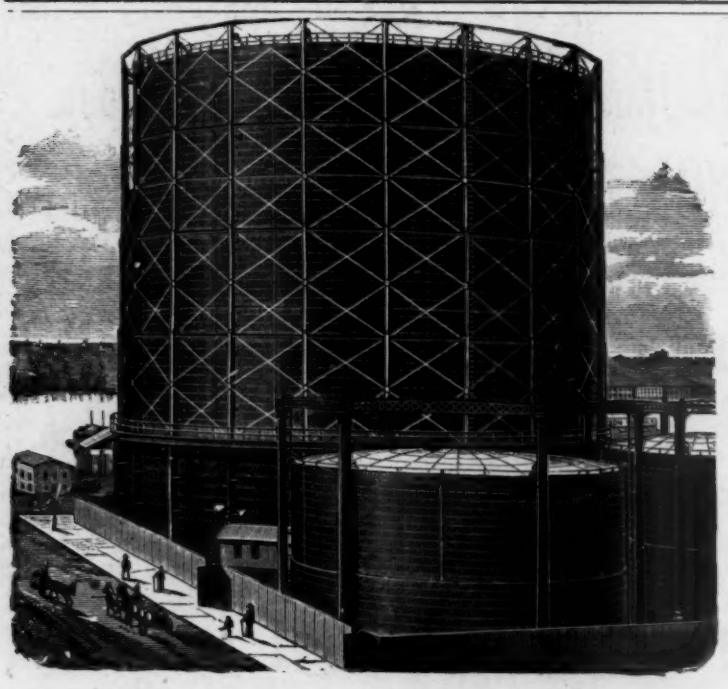

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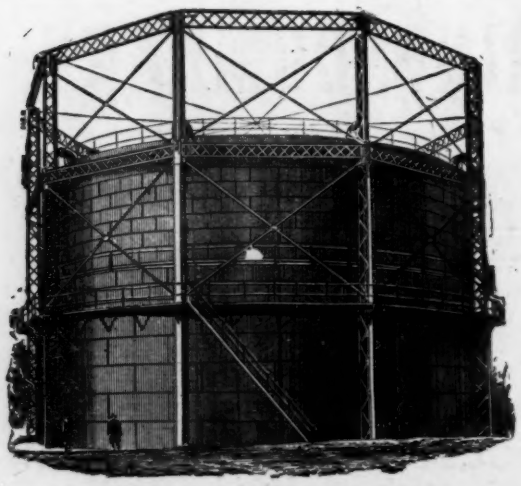

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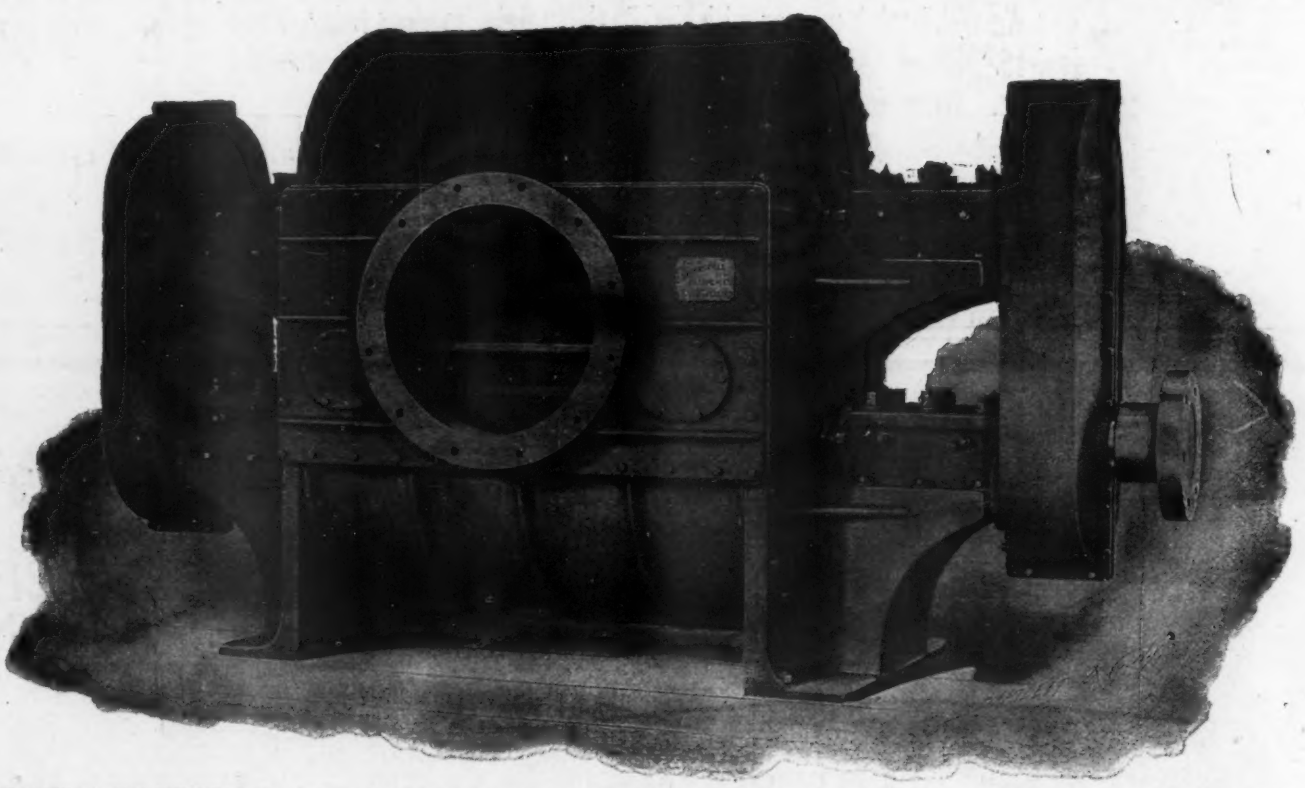

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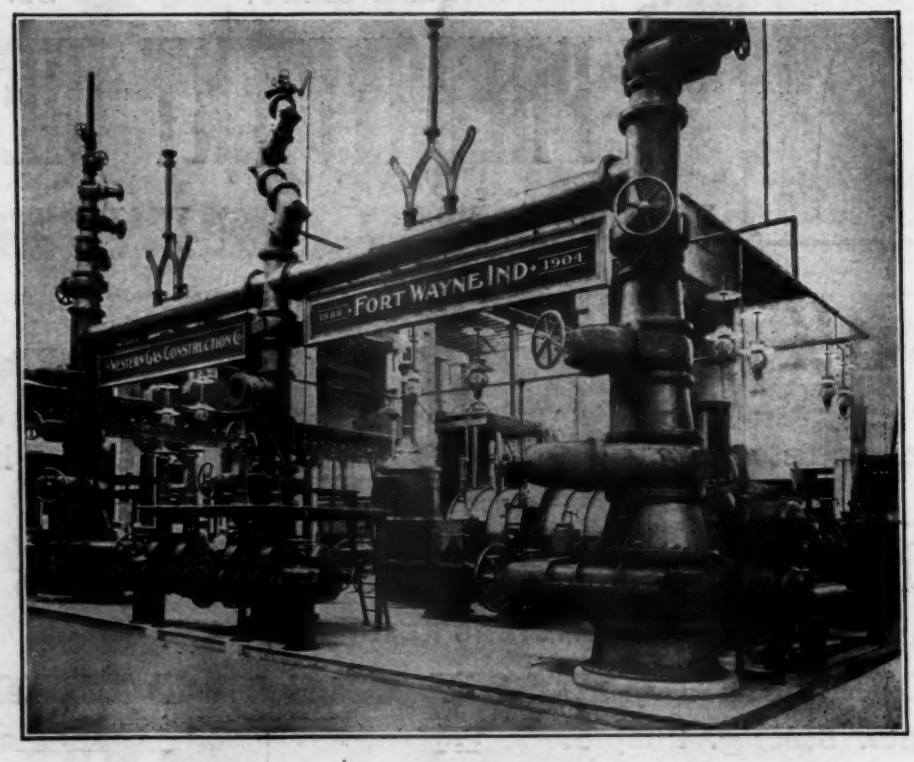

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